VOL. 7, NO. 2, FEBRUARY 1969 AIAA JOURNAL

Check for updates

A Doublet-Lattice Method for Calculating Lift Distributions on Oscillating Surfaces in Subsonic Flows

Edward Albano* and William P. Rodden†
Northrop Corporation, Norair Division, Hawthorne, Calif.

Approximate solutions from the linearized formulation are obtained by idealizing the surface as a set of lifting elements which are short line segments of acceleration-potential doublets. The normal velocity induced by an element of unit strength is given by an integral of the subsonic kernel function. The load on each element is determined by satisfying normal velocity boundary conditions at a set of points on the surface. It is seen a posteriori that the lifting elements and collocation stations can be located such that the Kutta condition is satisfied. The method obviates the prescription of singularities in lift distribution along lines where normal velocity is discontinuous, and is readily adapted for problems of complex geometries. Results compare closely with those from methods that prescribe lifting pressure modal series, and from pressure measurements. The technique constitutes an extension of a method developed by S. G. Hedman for steady flow.‡

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

Nomenclature

AR = aspect ratio
b = semichord
c = chord
K = kernel function
$\mathcal{K}$ = numerator of singular kernel
k = reduced frequency, $k = \omega b/U$
M = freestream Mach number
NC = number of boxes on chord
NS = number of boxes on semispan
P = lifting pressure
p = dimensionless lifting pressure coefficient, $p = P/\frac{1}{2}\rho U^2$
W = normal velocity at surface
w = dimensionless normal velocity (normalwash), $w = W/U$
t = time
s, σ = curvilinear spanwise coordinates on the surface; s also denotes span of planar surface
U = freestream velocity
x,y,z; ξ,η,ζ = Cartesian coordinates
γ = dihedral angle
ω = frequency of oscillation
ρ = freestream density
$(\bar{\ })$ = complex amplitude

Introduction

The linearized formulation of the oscillatory, subsonic, lifting surface theory relates the normal velocity at the surface

$$W(x,s,t) = URl[\bar{w}(x,s)\exp(i\omega t)]$$

to the pressure difference across the surface

$$P(x,s,t) = \tfrac{1}{2}\rho U^2 Rl[\bar{p}(x,s)\exp(i\omega t)]$$

by a singular integral equation and the Kutta condition at the trailing edge (TE):

$$\bar{w}(x,s) = \tfrac{1}{8}\pi \oint_S \int K(x,\xi;s,\sigma;\omega,M)\bar{p}(\xi,\sigma)d\xi d\sigma \qquad (1)$$

$$\bar{p}[x_{TE}(s),s] = 0$$

where (x,s) are orthogonal coordinates on the surface S such that the undisturbed stream is directed parallel to the x axis.

Rodemich[1] has derived an expression for the kernel function for a nonplanar surface in the form

$$K = e^{-(i\omega x_0/U)}(K_1T_1 + K_2T_2)/r_1^2 \qquad (2)$$

where

$$T_1 = \cos[\gamma(s) - \gamma(\sigma)]$$

$$T_2 = \left\{\frac{z_0}{r_1}\cos[\gamma(s)] - \frac{y_0}{r_1}\sin[\gamma(s)]\right\} \times \left\{\frac{z_0}{r_1}\cos[\gamma(\sigma)] - \frac{y_0}{r_1}\sin[\gamma(\sigma)]\right\}$$

$$r_1 = (y_0^2 + z_0^2)^{1/2}$$

$$x_0 = x - \xi \qquad y_0 = y - \eta \qquad z_0 = z - \zeta$$

and Landahl[2] has simplified the forms of K_1 and K_2 to read

$$K_1 = I_1 + [Mr_1/R][e^{-ik_1u_1}/(1 + u_1^2)^{1/2}]$$

$$K_2 = -3I_2 - \frac{ik_1M^2r_1^2}{R^2}\frac{e^{-ik_1u_1}}{(1+u_1^2)^{1/2}} - \frac{Mr_1}{R}\left[(1+u_1^2)\frac{\beta^2r_1^2}{R^2} + 2 + \frac{Mr_1u_1}{R}\right]\frac{e^{-ik_1u_1}}{(1+u_1^2)^{3/2}}$$

where

$$I_1 = \int_{u_1}^{\infty}\frac{e^{-ik_1u}}{(1+u^2)^{3/2}}du \qquad (3)$$

$$I_2 = \int_{u_1}^{\infty}\frac{e^{-ik_1u}}{(1+u^2)^{5/2}}du \qquad (4)$$

$$u_1 = (MR - x_0)/\beta^2r_1$$

$$k_1 = \omega r_1/U \qquad \beta = (1 - M^2)^{1/2}$$

$$R = (x_0^2 + \beta^2r_1^2)^{1/2}$$

Presented as Paper 68-73 at the AIAA 6th Aerospace Sciences Meeting, New York, January 22–24, 1968; submitted February 13, 1968; revision received August 20, 1968. This research was sponsored by the Northrop Corporation Overhead Technical Activity Program.

* Senior Engineer, Structures and Dynamics Research Branch, Research and Technology Section. Associate Member AIAA.
† Consulting Engineer. Associate Fellow AIAA.

‡ At the time of writing, the authors learned that a similar extension had been developed independently by Stark,[22] which has been reported in Ref. 23.

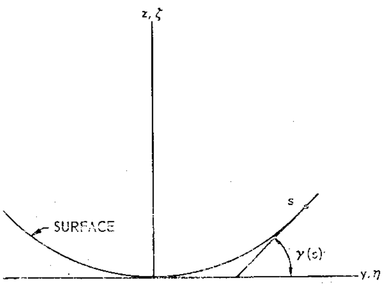


Fig. 1 Coordinate system.

The coordinate system is illustrated in Fig. 1. The symbol $\oint$ means that the integral in Eq. (1) is defined in the "finite part" sense.[3]

The traditional method for obtaining approximate solutions for $\bar{p}$ when $\bar{w}$ is given is to assume a series approximation

$$\bar{p} \approx \sum_i \sum_j a_{ij} f_i(x) g_j(s)$$

and to determine the coefficients a_{ij} by satisfying normal-velocity conditions on the surface. Known properties of the lifting pressure distribution $\bar{p}$ such as the behavior near surface edges are built into the approximation by appropriate choice of the functions in the series. This technique has been used successfully for many years, although most applications have been for planar wings without control surfaces.

Consideration of the efforts needed to develop a single computer program to handle a fairly general class of nonplanar problems has led the authors to seek a technique that would obviate the prescription of the behavior of $\bar{p}$ along edges and corners and, in fact, would remove a priori restrictions on the global behavior of the force distribution. The "box methods" for the supersonic problem provide examples of the method sought.

Doublet-Lattice Method

We describe a method which is an extension of the one developed for steady subsonic flow by Hedman[4] in 1965. The elements of the technique are to be found in the vortex-lattice method of Falkner.[5] The present study may be regarded as an extension of the method of Hedman in an analogous manner to the procedure by which Runyan and Woolston[6] extended the method of Falkner to the oscillatory case. Since it appears at the present time that a rigorous analytical basis for the method is not available, we present an operational description as follows.

It is assumed that the surface can be approximated by segments of planes. The surface is divided into small trapezoidal panels ("boxes") in a manner such that the boxes are arranged in columns parallel to the freestream (Fig. 2), and surface edges and fold lines lie on box boundaries. The $\frac{1}{4}$-chord line of each box is taken to contain a distribution of acceleration potential doublets§ of uniform but unknown strength. In steady flow, each doublet line segment is equivalent to a horseshoe vortex whose "bound" segment coincides with the doublet line.

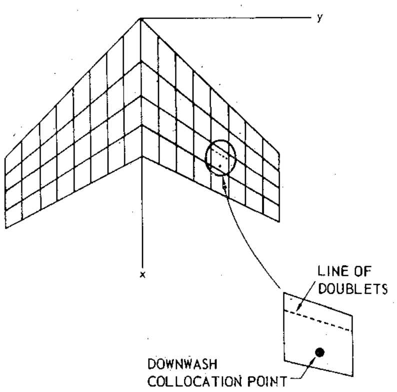


Fig. 2 Surface and panel geometry.

Let n be the number of boxes and f be the *constant* force per unit length of the $\frac{1}{4}$-chord line of a box. The amplitude of the doublet strength of the jth line segment is

$$(\bar{f}_j/4\pi\rho) \int_{l_j} d\mu$$

where $d\mu$ is the incremental length and l_j is the length of the line segment, and the amplitude of the normal velocity (normalwash) induced at a point (x_i,s_i) on the surface by the jth doublet line is

$$\bar{w}_j(x_i,s_i) = \left(\frac{\bar{f}_j}{4\pi\rho} U^2\right) \oint_{l_j} K[x_i s_i; x_j(\mu), s_j(\mu)] d\mu$$

The total normal wash induced at point (x_i,s_i) is the sum of the normal washes induced by the n doublet lines

$$\bar{w}(x_i,s_i) = \sum_{j=1}^{n} \left(\frac{\bar{f}_j}{4\pi\rho} U^2\right) \oint_{l_j} K[x_i,s_i; x_j(\mu), s_j(\mu)] d\mu \quad (5)$$

If Eq. (5) is applied at n downwash points on the surface, the $\bar{f}_j$ are determined. The force on the doublet line is taken as the force on the box and the pressure difference across the surface is approximated by

$$\bar{P}_j = \text{force}/(\text{box area}) = \bar{f}_j l_j/(\text{box area})$$
$$= \bar{f}_j/\Delta x_j \cos\lambda_j$$

where Δx_j is the box average chord and λ_j the sweep angle of the doublet line, so that

$$\bar{f}_j/4\pi\rho U^2 = \tfrac{1}{8}\pi \bar{p}_j \Delta x_j \cos\lambda_j$$

We note that the induced downwash calculated by Eq. (5) will be infinite if the downwash point lies on a doublet line segment or downstream from its end points. Furthermore, the Kutta condition has not been imposed. However, from numerical experimentation with this technique, it has become apparent that the Kutta condition will be satisfied when each downwash point is the $\frac{3}{4}$-chord point at midspan of a box.

Equation (5) may finally be written

$$\bar{w}_i = \sum_{j=1}^{n} D_{ij} \bar{p}_j$$

where

$$D_{ij} = \left(\frac{1}{8}\pi\right) \Delta x_j \cos\lambda_j \oint_{l_j} K[x_i,s_i; x_j(\mu), s_j(\mu)] d\mu \quad (6)$$

If A_{ij} are the elements of the matrix whose inverse is the matrix of D_{ij}, then

$$\bar{p}_i = \sum_{j=1}^{n} A_{ij} \bar{w}_j$$

provides the approximate solution for the lifting pressure coefficients.

Generalized force coefficients are computed approximately by

$$\bar{Q}_{ij} = \frac{1}{b_r^2 s_r} \sum_{k=1}^{n} h_k^{(i)} \bar{p}_k^{(j)} S_k$$

§ See, e.g., Ref. 7, pp. 189 and 198, or Ref. 8, pp. 19, 130, and 211 for a discussion of Prandtl's acceleration potential.

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

where

S_k = area of box k
$h_k^{(i)}$ = deflection in mode i of $\frac{1}{4}$-chord, midspan point of box k
$\bar{p}_k^{(j)}$ = pressure coefficient in mode j at box k
b_r = reference semichord
s_r = reference semispan

Working Forms

Approximate evaluation of the integral in Eq. (6) is achieved by approximating the integrand by a simple function. We consider the downwash induced at a receiving point $R = (x_R, y_R, z_R)$ by a doublet line segment whose midpoint is S_m and whose inboard and outboard end points are S_i and S_o, respectively. Let

$$\mathcal{K} = r_1^2 K$$

Denote

$$\mathcal{K}_m = \mathcal{K}(R,S_m) = \mathcal{K}(x_R,y_R,z_R;x_{Sm},y_{Sm},z_{Sm};\omega,M)$$

$$\mathcal{K}_i = \mathcal{K}(R,S_i) \qquad \mathcal{K}_o = \mathcal{K}(R,S_o)$$

Define the coordinate system (Fig. 3)

$$\eta = y \cos\gamma_S + z \sin\gamma_S$$

$$\zeta = -y \sin\gamma_S + z \cos\gamma_S$$

If the length of the doublet segment is small, it may be anticipated that a parabolic approximation for $\mathcal{K}$ along the segment would be sufficiently accurate for evaluating the integral;

$$\begin{aligned} I_{ij} &= \oint_{l_i} K[x_i,s_i;x_j(\mu),s_j(\mu);\omega,M] \cos\lambda_j d\mu \\ &\approx \oint_{-e}^{e} \frac{A\eta^2 + B\eta + C}{(\eta_0 - \eta)^2 + \zeta_0^2} d\eta \end{aligned} \tag{7}$$

where

$$e = \tfrac{1}{2} l_j \cos\lambda_j$$

$$\eta_0 = (y_R - y_{Sm}) \cos\gamma_S + (z_R - z_{Sm}) \sin\gamma_S$$

$$\zeta_0 = -(y_R - y_{Sm}) \sin\gamma_S + (z_R - z_{Sm}) \cos\gamma_S$$

$$A = (\mathcal{K}_i - 2\mathcal{K}_m + \mathcal{K}_o)/2e^2$$

$$B = (\mathcal{K}_o - \mathcal{K}_i)/2e \qquad C = \mathcal{K}_m$$

The result of the integration is

$$I_{ij} \approx [(\eta_0^2 - \zeta_0^2)A + \eta_0 B + C]|\zeta_0|^{-1} \tan^{-1}\left(\frac{2e|\zeta_0|}{r_1^2 - e^2}\right) + \left(\frac{1}{2} B + \eta_0 A\right) \log\frac{r_1^2 - 2\eta_0 e + e^2}{r_1^2 + 2\eta_0 e + e^2} + 2eA$$

where $r_1^2 = \eta_0^2 + \zeta_0^2$. For the planar case ($\zeta_0 \to 0$),

$$I_{ij} = (\eta_0^2 A + \eta_0 B + C)\left(\frac{1}{\eta_0 - e} - \frac{1}{\eta_0 + e}\right) + \left(\frac{1}{2} B + \eta_0 A\right) \log\left(\frac{\eta_0 - e}{\eta_0 + e}\right)^2 + 2eA$$

In order to converge to Hedman's vortex-lattice results for steady flow and to improve the approximation of Eq. (7), the authors have found it necessary to subtract the steady part ($\omega = 0$) from $\mathcal{K}$ before applying the preceding formulas, and then to add the effect of a horseshoe vortex. The error in the parabolic approximation appears to be small if the division of the surface into boxes is such that the boxes have aspect ratios of order unity. The steady values of K_1 and K_2 are

$$K_1(\omega = 0) = 1 + x_o/R$$

$$K_2(\omega = 0) = -2 - (x_o/R)(2 + \beta^2 r_1^2/R^2)$$

In any event, it is necessary to evaluate numerically the kernel function, Eq. (2), at a number of points, and hence to evaluate the integrals I_1 and I_2, Eqs. (3) and (4), respectively. Approximate evaluation of these integrals may be accomplished in many ways. L. Schwarz[9] has given an expression for I_1 in terms of infinite series. However, we prefer to approximate the integrands by simple functions. It is sufficient to consider nonnegative arguments because of symmetry properties of the integrand. Integrating Eq. (3) by parts gives

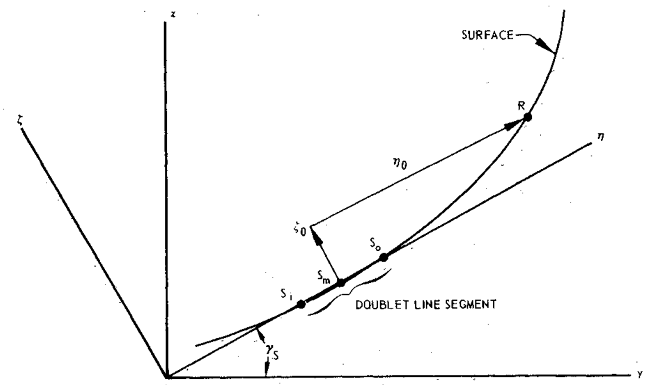


Fig. 3 Sending panel coordinate system.

$$I_1(u_1;k_1) = \left[1 - \frac{u_1}{(1 + u_1^2)^{1/2}}\right] e^{-ik_1u_1} - ik_1 \int_{u_1}^{\infty} \left[1 - \frac{u}{(1 + u^2)^{1/2}}\right] e^{-ik_1u}\, du$$

Watkins, Runyan, and Cunningham[10] have given the formula

$$t/(1 + t^2)^{1/2} \approx 1 - 0.101 \exp(-0.329t) - 0.899 \exp(-1.4067t) - 0.09480933 \exp(-2.90t) \sin\pi t$$

$$(t \geq 0)$$

which when substituted in the foregoing yields a simple expression for I_1. The integral I_2 is evaluated in similar fashion, requiring integration of Eq. (4) by parts twice.

In view of the lack of a rigorous basis for the foregoing assumptions, it is necessary to demonstrate the adequacy of the doublet-lattice method by comparison of results with solutions obtained by other means, and with experimental data.

Results for Two-Dimensional Flow

For planar flow, the integral equation (1) becomes the one-dimensional integral equation of Possio (see, e.g., Sec. 6-4 of Ref. 7) and the doublet line segments become two-dimensional doublets on the chord. The results of the doublet-lattice method presented here have been obtained by dividing the airfoil chord into equal intervals and locating each sending and receiving point at the $\frac{1}{4}$-chord and $\frac{3}{4}$-chord, respectively, of each interval.

For graphical presentation of results, the values of the lifting pressure coefficient $\bar{p}$ are plotted at the sending points and smooth curves are drawn going to zero at the trailing edge. In describing results, we use the term "boxes" to mean intervals in two-dimensional flow or small panels in three-dimensional flow, and

NC = number of boxes per surface chord
NS = number of boxes per semispan (planar surfaces)

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

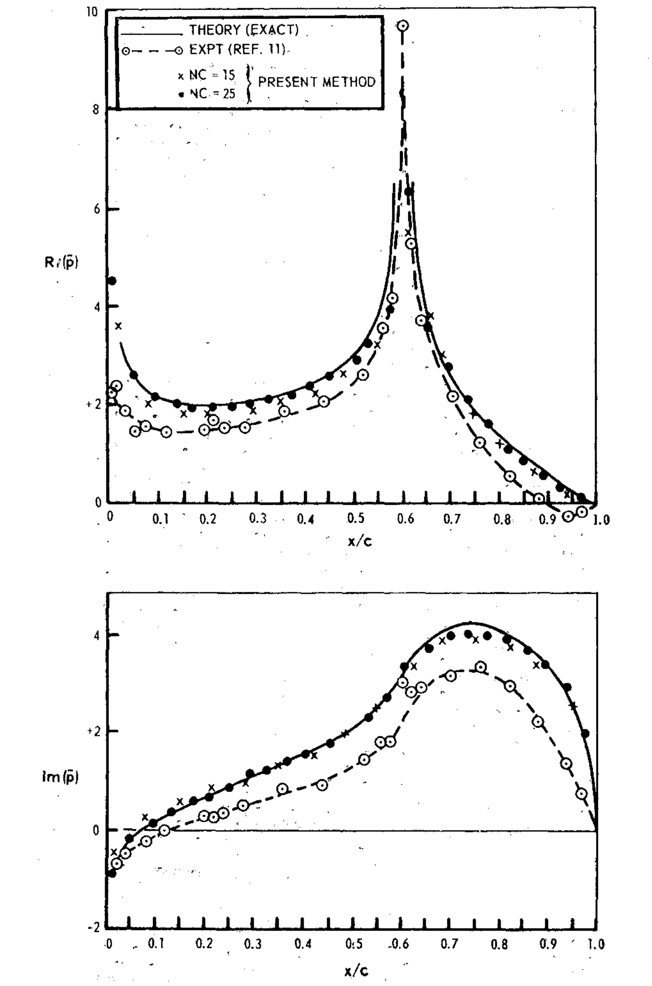


Fig. 4 Lifting pressure distribution on airfoil with oscillating flap in two-dimensional flow, $M = 0$, $k = 1.0$.

For incompressible flow, exact solutions are available. Solutions for an airfoil with oscillating flap are compared in Fig. 4, where measurements reported by Bergh[11] are included.

For compressible flow, Table 1 presents a comparison of generalized forces for a flapped airfoil from the present method and from the tables of Ref. 12. The coefficients are defined by

$$L = \pi\rho U^2 b e^{ikt}(Ak_a + Bk_b + Ck_c)$$

$$M = \pi\rho U^2 b^2 e^{ikt}(Am_a + Bm_b + Cm_c)$$

$$N = \pi\rho U^2 b^2 e^{ikt}(An_a + Bn_b + Cn_c)$$

where

L = force of airfoil and flap, positive downward
M = moment of wing and flap about midchord, positive tail heavy
N = moment of flap about hinge axis, positive tail heavy
Ab = translation amplitude, positive downward
B = amplitude of airfoil rotation about midchord, positive trailing edge down
C = amplitude of flap rotation, positive trailing edge down

Results shown in Table 1 are for the case $M = 0.8$, $k = 0.9$, τ = (flap chord)/(airfoil chord) = 0.3. The tabulated results indicate that the doublet-lattice approximation is valid for high subsonic Mach numbers and reduced frequencies of order unity.

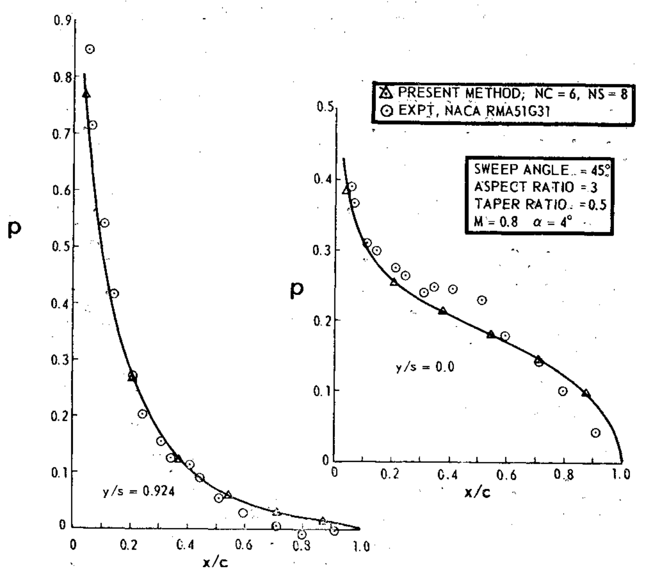


Fig. 5 Lift distribution on swept wing in steady flow.

Results for Three-Dimensional Flows

Figure 5 compares calculated lift distributions with measurements reported by Kolbe and Boltz[13] for a swept, tapered wing at incidence in steady flow. For this problem, the semiwing was divided into 48 boxes, each containing a horseshoe vortex as in Hedman's method. Results for the wing stations shown were obtained by interpolation.

Calculations and measurements for a wing with partial-span flap are presented in Fig. 6. The curves labeled "experiment" were obtained by reduction of graphical data of Hammond and Keffer,[14] and, for this reason, are rather imprecise. Calculations were made with 80 horseshoe vortices on the semiwing, eight vortices being on the flap. Landahl[15] has shown that both the form and strength of the pressure singularity at the hinge line can be determined analytically. The expression for the lift distribution for unit flap angle is

$$p = (-2/\pi\beta_n)\cos\lambda_c \log|(x - x_c)/c| + 0(1) \qquad (8)$$

where x_c = streamwise coordinate of hinge, λ_c = hingeline sweep angle, $\beta_n = (1 - M^2\cos^2\lambda_c)^{1/2}$, and c = local chord. For the wing considered here, $\lambda_c \approx 30°$ and $M = 0.6$; the singular part of Eq. (8) becomes

$$p \approx -0.645 \log|(x - x_c)/c| \qquad (9)$$

The graph of this expression is labeled "local solution" in Fig. 6a. Figure 6b shows the distribution of lift on the semiwing calculated by the Hedman vortex-lattice technique.

Both kernel function calculations and measurements of lift distribution reported by Lessing, Troutman, and Menees[16] are compared in Fig. 7 with results from the doublet-lattice method. The rectangular wing (aspect ratio = 3) considered is oscillating in a bending mode described approximately by

$$\bar{h} \approx 0.18043|(y/s)| + 1.70255(y/s)^2 - 1.13688|(y/s)^3| + 0.25387(y/s)^4$$

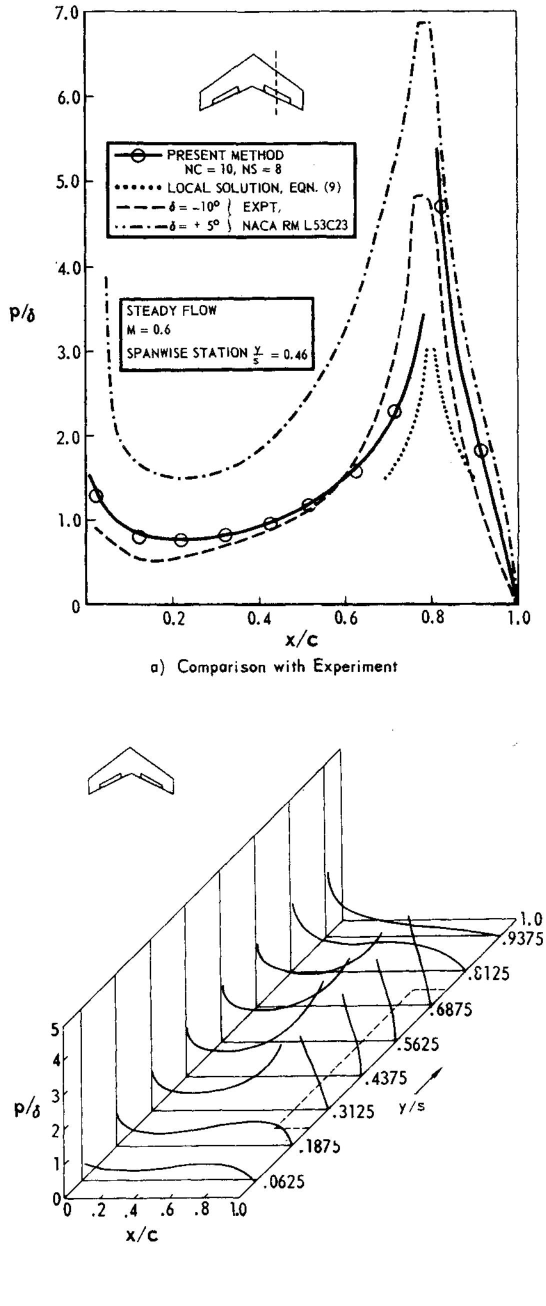
where $\bar{h}$ is the nondimensional deflection amplitude. In Fig. 7, α_h denotes the magnitude of the effective oscillatory angle of attack at the wing tip due to bending.

Table 1 Coefficients for oscillating flapped airfoil

	20 "boxes"	30 "boxes"	Ref. 12
k_a	$-0.0075 - 1.118i$	$-0.0197 - 1.119i$	$-0.0444 - 1.1201i$
k_b	$-1.571 - 0.0291i$	$-1.574 - 0.0795i$	$-1.5755 - 0.0267i$
k_c	$-0.4835 + 0.0789i$	$-0.4824 + 0.0823i$	$-0.4803 + 0.0868i$
m_a	$0.3293 + 0.1005i$	$0.3303 + 0.0924i$	$0.3309 + 0.0760i$
m_b	$-0.0391 - 0.8604i$	$-0.0572 - 0.8623i$	$-0.0946 - 0.8619i$
m_c	$-0.4075 + 0.0021i$	$-0.4105 + 0.0058i$	$-0.4147 + 0.0248i$
n_a	$0.0584 - 0.0626i$	$0.0591 - 0.0638i$	$0.0601 - 0.0661i$
n_b	$-0.0745 - 0.1456i$	$-0.0762 - 0.1474i$	$-0.0798 - 0.1504i$
n_c	$-0.0912 - 0.0696i$	$-0.0919 - 0.0712i$	$-0.0931 - 0.0739i$

Results of computations for another rectangular wing (aspect ratio = 2) with full-span, 40% chord, oscillating flap are shown in Fig. 8. These are compared with kernel function calculations (with built-in hingeline singularity) given by Curtis, Gikas, and Hassig[17] and experimental data of Beals and Targoff.[18] The doublet-lattice calculations were made with 99 boxes on the semiwing and, of these, 45 boxes were on the flap.

The rolling moment of the horizontal stabilizer of a rectangular T-tail configuration is shown in Fig. 9,¶ where measurements by Clevenson and Leadbetter[19] are repro-

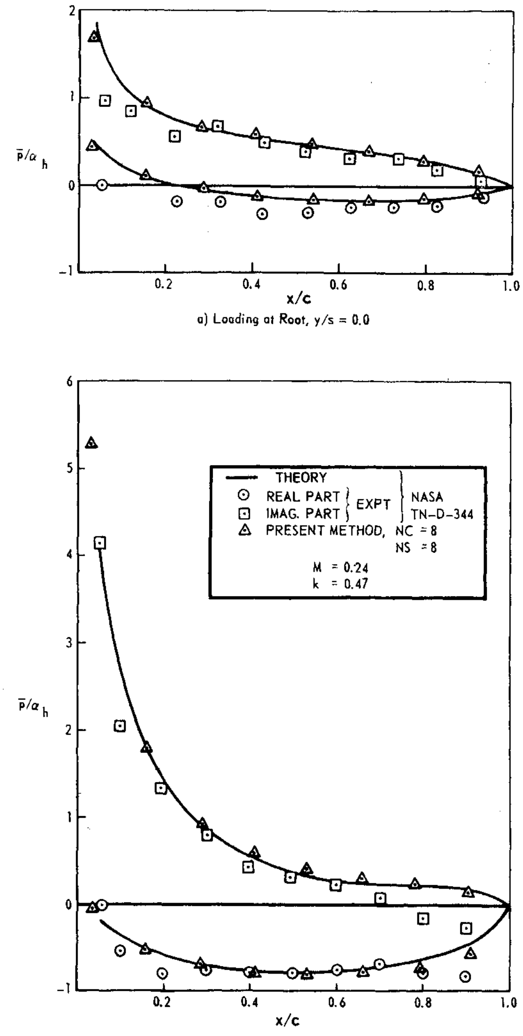


a) Comparison with Experiment

b) Calculated Lift Distribution on Wing

Fig. 6 Lift distribution induced by deflected partial-span flap.

¶ Note that the side force results presented in Fig. 9 of AIAA Paper 68-73 were incorrect because of a mistake in the computer program. The rolling moment of the horizontal stabilizer is presented here in place of the side force since it is a more critical measure of the accuracy of an interference theory. The complete solution is given in Ref. 21.



a) Loading at Root, y/s = 0.0

b) Loading Near Tip, y/s = 0.9

Fig. 7 Lift distribution on rectangular wing oscillating in bending mode.

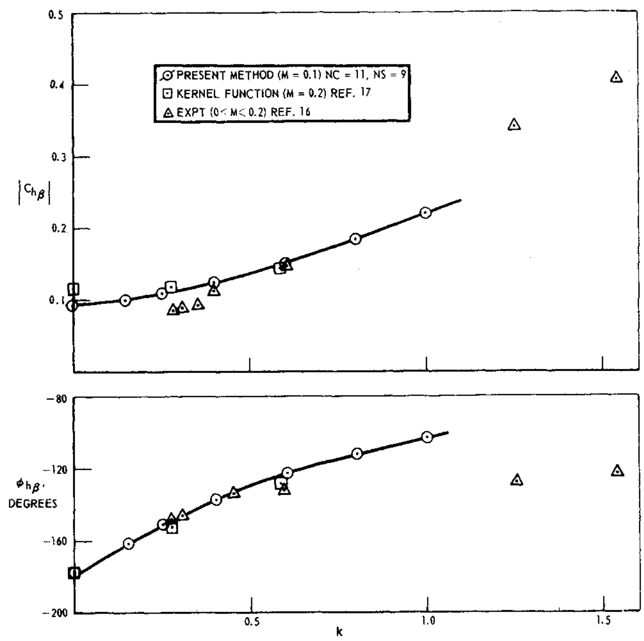


Fig. 8 Flap hinge moment coefficient due to flap oscillation for a 40% chord, full-span flap on a rectangular wing with aspect ratio 2.

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

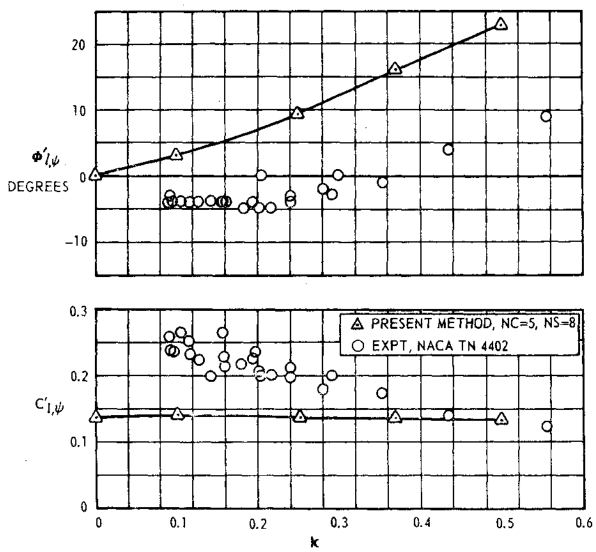


Fig. 9 Rolling moment coefficient of horizontal stabilizer for simplified T-tail oscillating in yaw about fin midchord, $M = 0$.

duced. To account in part for the tunnel wall, the image system of the fin was included in the calculations; the image of the horizontal stabilizer was neglected. Forty boxes were placed on the fin and 40 on the horizontal stabilizer semispan. The discrepancy between calculations and experimental data for increasing reduced frequency might be due to the relatively small number of boxes used or to the incomplete modelling of the effect of the tunnel wall.** The T-tail results illustrate that nonplanar interference problems are easily approached by the doublet-lattice technique.

Concluding Remarks

Within the context of the linearized, subsonic, lifting surface theory, two types of approximations are involved in the doublet-lattice method. The assumption that for purposes of calculating lift distributions the surface can be represented by a system of line segments of acceleration potential doublets is seen to be a valid approximation in view of the results obtained. As far as the authors are aware, an analytical basis for this approximation has not been established and warrants further study so that its full implications may be brought out. Such an investigation would also determine the extent to which the box chord-lengths on a strip and strip-widths across the span may be unequal. However, until a rigorous basis is found, further numerical experiments will be necessary to define the limitations of the method. The second kind of approximation is associated with the evaluation of the integrals in the kernel, Eqs. (3) and (4), and in the normalwash-pressure influence coefficients, Eq. (6). These procedures may be improved and optimized according to standard techniques of numerical quadrature.

The advantages of the doublet-lattice method arise from being able to disregard the special behavior of the lift distribution where the normalwash is discontinuous. So long as edges do not intersect boxes, a computer program based on this technique does not need to discriminate among side edges, fold lines, hinge lines, etc., and this fact is important when problems of intersecting surfaces are considered. Furthermore, since the influence coefficients D_{ij} are independent of the properties of the normalwash distribution, the same matrix computed for a given wing will yield solutions for a large class of normalwash distributions; e.g., generalized forces for many different control surface configurations may be obtained from the same influence coefficient matrix.

For applications in aeroelastic analyses, aerodynamic influence coefficients that relate control point forces to deflections have been defined by Rodden and Revell.[20] The doublet-lattice method leads immediately to this definition of influence coefficients since the control point force is given by the product of lifting pressure and box area, and the normalwash is the substantial derivative in the streamwise direction of the deflection. (The substantial derivative requires curve fitting "in-the-small" along the surface strip; e.g., a parabola may be passed through the control point and the points upstream and downstream of it.) If a reduced number of degrees of freedom is desired for the aeroelastic analysis over the number of boxes employed in the aerodynamic analysis, the number of control point forces and deflections may be reduced by a streamwise curve fit and the method of virtual work as discussed in Ref. 20.

** The effects of viscosity and airfoil thickness, neglected by the linearized theory, undoubtedly also contribute to the discrepancy.

References

[1] Vivian, H. T. and Andrew, L. V., "Unsteady Aerodynamics for Advanced Configurations. Part I—Application of the Subsonic Kernel Function to Nonplanar Lifting Surfaces," FDL-TDR-64-152, May 1965, Air Force Flight Dynamics Lab.

[2] Landahl, M. T., "Kernel Function for Nonplanar Oscillating Surfaces in a Subsonic Flow," *AIAA Journal*, Vol. 5, No. 5, May 1967, pp. 1045–1046.

[3] Mangler, K. S., "Improper Integrals in Theoretical Aerodynamics," R&M 2424, 1951, British Aeronautical Research Council.

[4] Hedman, S. G., "Vortex Lattice Method for Calculation of Quasi Steady State Loadings on Thin Elastic Wings," Rept. 105, Oct. 1965, Aeronautical Research Institute of Sweden.

[5] Falkner, V. M., "The Calculation of Aerodynamic Loading on Surfaces of Any Shape," R&M 1910, 1943, British Aeronautical Research Council.

[6] Runyan, H. L. and Woolston, D. S., "Method for Calculating the Aerodynamic Loading on an Oscillating Finite Wing in Subsonic and Sonic Flow," TR 1322, 1957, NACA.

[7] Bisplinghoff, R. L., Ashley, H., and Halfman, R. L., *Aeroelasticity*, Addison-Wesley, Reading, Mass., 1955.

[8] Ashley, H. and Landahl, M., *Aerodynamics of Wings and Bodies*, Addison-Wesley, Reading, Mass., 1965.

[9] Schwarz, L., "Investigation of Some Functions Related to the Cylinder Functions of Zero Order," *Luftfahrtforshung*, Vol. 20, No. 12, 1944, pp. 341–372.

[10] Watkins, C. E., Runyan, H. L., and Cunningham, H. J., "A Systematic Kernel Function Procedure for Determining Aerodynamic Forces on Oscillating or Steady Finite Wings at Subsonic Speeds," R-48, 1959, NASA.

[11] Bergh, H., "A New Method for Measuring the Pressure Distribution on Harmonically Oscillating Wings of Arbitrary Planform," MP.224, 1964, National Aeronautical and Astronautical Research Institute, Amsterdam.

[12] "Tables of Aerodynamic Coefficients for an Oscillating Wing-Flap System in a Subsonic Compressible Flow," F.151, May 1954, National Aeronautical and Astronautical Research Institute, Amsterdam.

[13] Kolbe, C. D. and Boltz, F. W., "The Forces and Pressure Distribution at Subsonic Speeds on a Plane Wing Having 45° of Sweepback, an Aspect Ratio of 3, and a Taper Ratio of 0.5," RM A51G31, 1951, NACA.

[14] Hammond, A. D. and Keffer, B. M., "The Effect at High Subsonic Speeds of a Flap-Type Aileron on the Chordwise Pressure Distribution Near Mid-Semi-Span of a Tapered 35° Sweptback Wing of Aspect Ratio 4 Having NACA 65A006 Section," RM L53C23, 1953, NACA.

[15] Landahl, M. T., "On the Pressure Loading Functions for Oscillating Wings With Control Surfaces," *Proceedings of the AIAA/ASME 8th Structures, Structural Dynamics and Materials Conference*, AIAA, 1967, pp. 142–147.

[16] Lessing, H. C., Troutman, J. L., and Menees, G. P., "Experimental Determination of the Pressure Distribution on a

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

Rectangular Wing Oscillating in the First Bending Mode for Mach Numbers from 0.24 to 1.30," TN D-344, 1960, NASA.

[17] Curtis, A. R., Gikas, X. A., and Hassig, H. J., "Oscillatory Flap Aerodynamics—Comparison Between Theory and Experiment," paper presented at the Aerospace Flutter and Dynamics Council Meeting, Cocoa Beach, Fla., Nov. 1967.

[18] Beals, V. and Targoff, W. P., "Control Surface Oscillatory Coefficients Measured on Low-Aspect Ratio Wings," TR 53-64, April 1953, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.

[19] Clevenson, S. A. and Leadbetter, S. A., "Measurements of Aerodynamic Forces and Moments at Subsonic Speeds on a Simplified T-tail Oscillating in Yaw About the Fin Mid-Chord," TN 4402, 1958, NACA.

[20] Rodden, W. P. and Revell, J. D., "The Status of Unsteady Aerodynamic Influence Coefficients," Paper FF-33, presented to IAS 30th Annual Meeting, January 22–24, 1962; preprinted in Rept. TDR-930(2230-09)TN-2, Nov. 22, 1961, Aerospace Corp.

[21] Rodden, W. P. and Albano, E., "The Subsonic Aerodynamic Loads on a Simplified T-Tail Oscillating in Yaw—Summary of Calculations and Comparison with Experiment," NOR-68-126, Aug. 1968, Northrop Corp.

[22] Stark, V. J. E., private communication to W. P. Rodden, Nov. 10, 1967.

[23] Landahl, M. T. and Stark, V. J. E., "Numerical Lifting-Surface Theory Problems and Progress," Paper 68-72, 1968, AIAA; also *AIAA Journal*, Vol. 6, No. 11, Nov. 1968; pp. 2049–2060.

FEBRUARY 1969 AIAA JOURNAL VOL. 7, NO. 2

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

Aerodynamic Shattering of Liquid Drops

A. A. RANGER* AND J. A. NICHOLLS†
The University of Michigan, Ann Arbor, Mich.

New experimental and analytical results are reported for the problem of liquid drop shattering. Breakup is observed to occur as a result of the interaction between a drop and the convective flowfield established by the passage of a shock wave over it. The purpose of this investigation, which supplements and extends previous experimental and theoretical studies, is to establish the influence of various parameters on the rate of disintegration and on the time required for breakup to occur. Photographic, drop displacement, and break-up time information is presented for a range of conditions which involve shock waves moving at Mach numbers M_s = 1.5-3.5 in air over water drops having diameters of 750-4000μ. A model is formulated for the breakup phenomenon by considering that it results from a boundary-layer stripping mechanism. The experimental determination of the variation of drop shape and of drop velocity with time is used together with the analytical results to compute the disintegration rate.

Nomenclature

A	=	dimensionless interface velocity
a	=	drop acceleration (dW/dt)
C_D	=	drag coefficient
D	=	drop diameter
M, m	=	droplet mass
M_s	=	shock Mach number
P, p	=	static pressure
q	=	dynamic pressure
R	=	drop radius
Re	=	Reynolds number
S	=	drop frontal area ($\pi D^2/4$)
t	=	time after collision
$\bar{T}$	=	dimensionless time $[t(U_2/D_0)(\beta)^{1/2}]$
U	=	fluid velocity
u	=	boundary-layer velocity
W	=	drop velocity
x	=	drop displacement
$\bar{X}$	=	dimensionless displacement (x/D_0)
α	=	boundary-layer shape factor
β	=	gas-to-liquid density ratio (ρ_g/ρ_l)
μ	=	fluid viscosity (also implies micro and micron)
ν	=	kinematic viscosity
ρ	=	fluid density

Subscripts

1	=	initial conditions
2	=	shock conditions
b	=	breakup
g	=	gas
l	=	liquid
0	=	$t = 0$
r	=	relative velocity
∞	=	freestream velocity

Presented as Paper 68-83 at the AIAA 6th Aerospace Sciences Meeting, New York, January 22–24, 1968; submitted February 8, 1968; revision received June 17, 1968. The work reported here was conducted under NASA Contract NASr 54(07).

* Assistant Research Engineer, Department of Aerospace Engineering; now Assistant Professor, School of Aeronautics, Astronautics, and Engineering Sciences, Purdue University. Member AIAA.

† Professor, Department of Aerospace Engineering. Associate Fellow AIAA.

I. Introduction

THE fragmentation of liquid drops, resulting from their sudden exposure to a high-velocity gas stream, has many important applications in the fields of aerodynamics and propulsion. For example, the phenomenon of supersonic rain erosion, which is caused by the impingement of rain droplets at high relative speeds on exterior missile and aircraft surfaces, can be greatly alleviated through proper aerodynamic design. A reduction in the damage sustained from impacting drops is achieved by designing a body whose detached shock is sufficiently far removed to allow for drop shattering in the region separating the shock from the body surface. With regard to propulsion, the rate of mixing and combustion of liquid fuel droplets can be greatly enhanced by virtue of the fragmentation process. As a result of droplet breakup, burning rates are obtainable which are higher than

This article has been cited by:

1. Réka Dóra Mocsányi, Béla Takarics, Aditya Kotikalpudi, Bálint Vanek. 2020. Grid-Based and Polytopic Linear Parameter-Varying Modeling of Aeroelastic Aircraft with Parametric Control Surface Design. *Fluids* **5**:2, 47. [Crossref]
2. Salvatore Maraniello, Rafael Palacios. 2020. Parametric Reduced-Order Modeling of the Unsteady Vortex-Lattice Method. *AIAA Journal* **58**:5, 2206-2220. [Abstract] [Full Text] [PDF] [PDF Plus]
3. Alexandre N. Marques, Max M. J. Opgenoord, Remi R. Lam, Anirban Chaudhuri, Karen E. Willcox. 2020. Multifidelity Method for Locating Aeroelastic Flutter Boundaries. *AIAA Journal* **58**:4, 1772-1784. [Abstract] [Full Text] [PDF] [PDF Plus]
4. Xiaochen Hang, Weihua Su, Qingguo Fei, Dong Jiang. 2020. Analytical sensitivity analysis of flexible aircraft with the unsteady vortex-lattice aerodynamic theory. *Aerospace Science and Technology* **99**, 105612. [Crossref]
5. Adrien Crovato, Hugo S. Almeida, Gareth Vio, Gustavo H. Silva, Alex P. Prado, Carlos Breviglieri, Huseyin Guner, Pedro H. Cabral, Romain Boman, Vincent E. Terrapon, Grigorios Dimitriadis. 2020. Effect of Levels of Fidelity on Steady Aerodynamic and Static Aeroelastic Computations. *Aerospace* **7**:4, 42. [Crossref]
6. A. Castrichini, T. Wilson, F. Saltari, F. Mastroddi, N. Viceconti, J. E. Cooper. 2020. Aeroelastics Flight Dynamics Coupling Effects of the Semi-Aeroelastic Hinge Device. *Journal of Aircraft* **57**:2, 333-341. [Abstract] [Full Text] [PDF] [PDF Plus]
7. Markus P. Rumpfkeil, Philip S. Beran. 2020. Multifidelity Sparse Polynomial Chaos Surrogate Models Applied to Flutter Databases. *AIAA Journal* **58**:3, 1292-1303. [Abstract] [Full Text] [PDF] [PDF Plus]
8. Daniel L Rodrigues, Earl H Dowell, Douglas D Bueno. 2020. On the stiffness and damping characteristics of magnetorheological dampers and their implications for flutter analysis. *Engineering Research Express* **2**:1, 015049. [Crossref]
9. Lan Yang, Changchuan Xie, Chao Yang. 2020. Geometrically exact vortex lattice and panel methods in static aeroelasticity of very flexible wing. *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering* **234**:3, 742-759. [Crossref]
10. Pengtao Shi, Jihai Liu, Yingsong Gu, Zhichun Yang, Pier Marzocca. 2020. Full-Span Flying Wing Wind Tunnel Test: A Body Freedom Flutter Study. *Fluids* **5**:1, 34. [Crossref]
11. Johannes K. S. Dillinger, Yasser M. Meddaikar, Jannis Lübker, Manuel Pusch, Thiemo Kier. 2020. Design and Optimization of an Aeroservoelastic Wind Tunnel Model. *Fluids* **5**:1, 35. [Crossref]
12. Ritsuya Hoshi, Yuichi Kuya, Keisuke Sawada. Numerical simulations of transonic flutter on a three-dimensional wing . [Abstract] [PDF] [PDF Plus]
13. Pau Castells Marin, Christophe Poetsch. Simulation of Flexible Aircraft Response to Gust and Turbulence for Flight Dynamics Investigations . [Abstract] [PDF] [PDF Plus]
14. Jeffrey A. Ouellette, Felipe D. Valdez. Generation and Calibration of Linear Models of Aircraft with Highly Coupled Aeroelastic and Flight Dynamics . [Abstract] [PDF] [PDF Plus]
15. Rui Cheng, Robert L. Spinetti, James Dubben, Sergey Kernazhitskiy. ZEUS Application for F-16 Limit-Cycle-Oscillation Prediction . [Abstract] [PDF] [PDF Plus]
16. Markus P. Rumpfkeil, Philip Beran. 2020. Multi-fidelity surrogate models for flutter database generation. *Computers & Fluids* **197**, 104372. [Crossref]
17. Michelle Guzman Nieto, Paul V. Thomas, Mostafa S. A. ElSayed, Mohamed Saad, Gary L. Brown, Lawrence M. Hilliard. 2019. Development of Efficient Dynamic Aeroelasticity Model for High Fidelity Pointing Accuracy Assessment of VLBI Earth-Based Radio Antennas. *International Journal of Aeronautical and Space Sciences* **49**. . [Crossref]
18. Fabien Huvelin, Arnaud Lepage, Sylvie Dequand. 2019. Experimental and numerical investigations of a 2D aeroelastic airfoil encountering a gust in transonic conditions. *CEAS Aeronautical Journal* **10**:4, 1101-1120. [Crossref]
19. Johannes K. S. Dillinger, Mostafa M. Abdalla, Yasser M. Meddaikar, Thomas Klimmek. 2019. Static aeroelastic stiffness optimization of a forward swept composite wing with CFD-corrected aero loads. *CEAS Aeronautical Journal* **10**:4, 1015-1032. [Crossref]
20. Jiaqing Kou, Weiwei Zhang. 2019. Multi-fidelity modeling framework for nonlinear unsteady aerodynamics of airfoils. *Applied Mathematical Modelling* **76**, 832-855. [Crossref]
21. Urban Fasel, Paolo Tiso, Dominic Keidel, Giulio Molinari, Paolo Ermanni. 2019. Reduced-Order Dynamic Model of a Morphing Airborne Wind Energy Aircraft. *AIAA Journal* **57**:8, 3586-3598. [Abstract] [Full Text] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

22. Michelle Guzman Nieto, Mostafa S. A. ElSayed, Denis Walch. 2019. Efficient global optimization and modal strain energy coefficient-based algorithm for fast prediction of dynamic aeroelastic loads. *Structural and Multidisciplinary Optimization* **60**:2, 817-834. [Crossref]
23. Eirikur Jonsson, Cristina Riso, Christopher A. Lupp, Carlos E.S. Cesnik, Joaquim R.R.A. Martins, Bogdan I. Epureanu. 2019. Flutter and post-flutter constraints in aircraft design optimization. *Progress in Aerospace Sciences* **109**, 100537. [Crossref]
24. Federico Roizner, Moti Karpel. 2019. Sensitivity of Aeroservoelastic Stability Characteristics Using Parametric Flutter Margins. *Journal of Aircraft* **56**:4, 1387-1397. [Abstract] [Full Text] [PDF] [PDF Plus]
25. Daniel Drewiacki, Flávio José Silvestre, Antônio Bernardo Guimarães Neto. 2019. Influence of Airframe Flexibility on Pilot-Induced Oscillations. *Journal of Guidance, Control, and Dynamics* **42**:7, 1537-1550. [Abstract] [Full Text] [PDF] [PDF Plus]
26. M. Akbar, J.L. Curiel-Sosa. 2019. An iterative finite element method for piezoelectric energy harvesting composite with implementation to lifting structures under Gust Load Conditions. *Composite Structures* **219**, 97-110. [Crossref]
27. Upender K. Kaul, Nhan T. Nguyen. Extending A Correction Method for Unsteady Transonic Aerodynamics to Variable Camber Continuous Trailing Edge Flap . [Citation] [PDF] [PDF Plus]
28. Sicheng He, Eirikur Jonsson, Charles A. Mader, Joaquim Martins. A Coupled Newton-Krylov Time Spectral Solver for Wing Flutter and LCO Prediction . [Citation] [PDF] [PDF Plus]
29. Prateek Ranjan, Kai A. James. Flutter Control Using Shape and Topology Optimization . [Citation] [PDF] [PDF Plus]
30. Salvatore Maraniello, Rafael Palacios. 2019. State-Space Realizations and Internal Balancing in Potential-Flow Aerodynamics with Arbitrary Kinematics. *AIAA Journal* **57**:6, 2308-2321. [Abstract] [Full Text] [PDF] [PDF Plus]
31. Max M. J. Opgenoord, Mark Drela, Karen E. Willcox. 2019. Influence of Transonic Flutter on the Conceptual Design of Next-Generation Transport Aircraft. *AIAA Journal* **57**:5, 1973-1987. [Abstract] [Full Text] [PDF] [PDF Plus]
32. P. Bekemeyer, M. Ripepi, R. Heinrich, S. Görtz. 2019. Nonlinear Unsteady Reduced-Order Modeling for Gust-Load Predictions. *AIAA Journal* **57**:5, 1839-1850. [Abstract] [Full Text] [PDF] [PDF Plus]
33. Vincenzo Muscarello, Francesca Colombo, Giuseppe Quaranta, Pierangelo Masarati. 2019. Aeroelastic Rotorcraft–Pilot Couplings in Tiltrotor Aircraft. *Journal of Guidance, Control, and Dynamics* **42**:3, 524-537. [Abstract] [Full Text] [PDF] [PDF Plus]
34. Maurizio Arena, Antonio Concilio, Rosario Pecora. 2019. Aero-servo-elastic design of a morphing wing trailing edge system for enhanced cruise performance. *Aerospace Science and Technology* **86**, 215-235. [Crossref]
35. P. Bekemeyer, S. Timme. 2019. Flexible aircraft gust encounter simulation using subspace projection model reduction. *Aerospace Science and Technology* **86**, 805-817. [Crossref]
36. Mohamed Mahran Kasem, Hani Negm, Adel Elsabbagh. 2019. Aeroelastic Modeling of Smart Composite Wings Using Geometric Stiffness. *Journal of Aerospace Engineering* **32**:2, 04018143. [Crossref]
37. Maurizio Arena, Rita Palumbo, Rosario Pecora, Francesco Amoroso, Gianluca Amendola, Ignazio Dimino. 2019. Flutter Clearance Investigation of Camber-Morphing Aileron Tailored for a Regional Aircraft. *Journal of Aerospace Engineering* **32**:2, 04018146. [Crossref]
38. Vladyslav Rozov, Maximilian Winter, Christian Breitsamter. 2019. Antisymmetric boundary condition for small disturbance CFD. *Journal of Fluids and Structures* **85**, 229-248. [Crossref]
39. Alvaro Cea, Rafael Palacios. Nonlinear Modal Aeroelastic Analysis from Large Industrial-Scale Models . [Citation] [PDF] [PDF Plus]
40. Nhan T. Nguyen, Jason Fugate, Upender K. Kaul, Juntao Xiong. Flutter Analysis of the Transonic Truss-Braced Wing Aircraft Using Transonic Correction . [Citation] [PDF] [PDF Plus]
41. Guilherme C. Barbosa, Rafael M. Bertolin, Juliano A. Paulino, Flavio Silvestre, Antônio B. Guimarães Neto. Design and Flight Test of a Stability Augmentation System for a Flexible Aircraft . [Citation] [PDF] [PDF Plus]
42. Alexandre N. Marques, Rémi Lam, Anirban Chaudhuri, Max M. Opgenoord, Karen E. Willcox. A multifidelity method for locating aeroelastic flutter boundaries . [Citation] [PDF] [PDF Plus]
43. Lucia Garcia Matas, Hamed Haddad Khodaparast, Micheal I. Friswell, Andrea Castrichini, Simon Coggon, Bennett Leong, Jonathan E. Cooper. Worst-case gust loads prediction with the effects of local structural nonlinearity . [Citation] [PDF] [PDF Plus]
44. Si-Hun Lee, Haeseong Cho, Haedong Kim, Sang Joon Shin. Expedited Aeroelastic Analysis Using Proper Orthogonal Decomposition and Reduced Order Modelling . [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

45. Rauno Cavallaro, Rocco Bombardieri. Studies on Lateral-directional Coupled Flight Dynamics and Aeroelasticity of a PrandtlPlane . [Citation] [PDF] [PDF Plus]
46. Federico Roizner, Moti Karpel. Sensitivity of Aeroservoelastic Stability Characteristics Using Parametric Flutter Margins . [Citation] [PDF] [PDF Plus]
47. Rocco Bombardieri, Rauno Cavallaro, Jorge Luis Sáez de Teresa, Moti Karpel. Nonlinear Aeroelasticity: a CFD-based Adaptive Methodology for Flutter Prediction . [Citation] [PDF] [PDF Plus]
48. Upender K. Kaul, Nhan T. Nguyen. A Correction Method for Unsteady Transonic Aerodynamics . [Citation] [PDF] [PDF Plus]
49. Thiemo M. Kier, Martin Leitner, Özge Süelözgen, Manuel Pusch. An Integrated Flexible Aircraft Model for Optimization of Lift Distributions . [Citation] [PDF] [PDF Plus]
50. Eirikur Jonsson, Charles A. Mader, Graeme Kennedy, Joaquim Martins. Computational Modeling of Flutter Constraint for High-Fidelity Aerostructural Optimization . [Citation] [PDF] [PDF Plus]
51. Daniel Nussbächer, Ögmundur Petersson, Fernass Daoud, Mirko Hornung. Multidisciplinary Optimisation of Flexible Aircraft Structures in Consideration of Flight Control System Demands in the Time Domain 1385-1397. [Crossref]
52. H. Güner, D. Thomas, G. Dimitriadis, V.E. Terrapon. 2019. Unsteady aerodynamic modeling methodology based on dynamic mode interpolation for transonic flutter calculations. *Journal of Fluids and Structures* **84**, 218-232. [Crossref]
53. Aleš Kratochví. 2019. A new approach of creating a finite element stick model for flutter analysis. *MATEC Web of Conferences* **304**, 01015. [Crossref]
54. Jing Bo Duan, Zhong Yuan Zhang. 2018. Aeroelastic Stability Analysis of Aircraft Wings with High Aspect Ratios by Transfer Function Method. *International Journal of Structural Stability and Dynamics* **18**:12, 1850150. [Crossref]
55. Robert Rogólski, Aleksander Olejnik. 2018. Structural model with controls of a very light airplane for numerical flutter calculations. *Aircraft Engineering and Aerospace Technology* **7**. . [Crossref]
56. Nur Azam Abdullah, Jose Luis Curiel-Sosa, Mahesa Akbar. 2018. Aeroelastic assessment of cracked composite plate by means of fully coupled finite element and Doublet Lattice Method. *Composite Structures* **202**, 151-161. [Crossref]
57. Ronald C. M. Cheung, Djamel Rezgui, Jonathan E. Cooper, Thomas Wilson. 2018. Testing of a Hinged Wingtip Device for Gust Loads Alleviation. *Journal of Aircraft* **55**:5, 2050-2067. [Abstract] [Full Text] [PDF] [PDF Plus]
58. Rui Huang, Haojie Liu, Zhijun Yang, Yonghui Zhao, Haiyan Hu. 2018. Nonlinear Reduced-Order Models for Transonic Aeroelastic and Aeroservoelastic Problems. *AIAA Journal* **56**:9, 3718-3731. [Abstract] [Full Text] [PDF] [PDF Plus]
59. Marius-Corné Meijer, Laurent Dala. 2018. Local Piston Theory as an Alternative to Mesh Deformation: Slender Wing/Body Configurations. *Journal of Aircraft* **55**:4, 1709-1719. [Abstract] [Full Text] [PDF] [PDF Plus]
60. Qing Zhou, Zhangwei Yu, Guoping Cai. 2018. Delayed sub-optimal control for active flutter suppression of a three-dimensional wing. *Journal of Fluids and Structures* **80**, 275-287. [Crossref]
61. Philipp Bekemeyer, Matteo Ripepi, Ralf Heinrich, Stefan Goertz. Nonlinear Unsteady Reduced Order Models based on Computational Fluid Dynamics for Gust Loads Predictions . [Citation] [PDF] [PDF Plus]
62. Wrik Mallik, Joseph A. Schetz, Rakesh K. Kapania. 2018. Rapid Transonic Flutter Analysis for Aircraft Conceptual Design Applications. *AIAA Journal* **56**:6, 2389-2402. [Abstract] [Full Text] [PDF] [PDF Plus]
63. Matthieu Parenteau, Éric Laurendeau. 2018. Nonlinear Frequency-Domain Solver for Vortex Lattice Method. *AIAA Journal* **56**:6, 2242-2251. [Abstract] [Full Text] [PDF] [PDF Plus]
64. Mahdi Nejati, Saeed Shokrollahi, Shahrokh Shams. 2018. Nonlinear aeroelastic analysis of high-aspect-ratio wings using indicial aerodynamics. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* **40**:6. . [Crossref]
65. Xie Changchuan, Yang Lan, Liu Yi, Yang Chao. 2018. Stability of Very Flexible Aircraft with Coupled Nonlinear Aeroelasticity and Flight Dynamics. *Journal of Aircraft* **55**:2, 862-874. [Abstract] [Full Text] [PDF] [PDF Plus]
66. Noud P. M. Werter, Roeland De Breuker, Mostafa M. Abdalla. 2018. Continuous-Time State-Space Unsteady Aerodynamic Modeling for Efficient Loads Analysis. *AIAA Journal* **56**:3, 905-916. [Abstract] [Full Text] [PDF] [PDF Plus]
67. Brenden P. Epps, Bernard T. Roesler. 2018. Vortex Sheet Strength in the Sears, Küssner, Theodorsen, and Wagner Aerodynamics Problems. *AIAA Journal* **56**:3, 889-904. [Abstract] [Full Text] [PDF] [PDF Plus]
68. Ronald C. Cheung, Christopher Wales, Djamel Rezgui, Jonathan E. Cooper, Thomas Wilson. Modelling of Folding Wing-Tip Devices for Gust Loads Alleviation . [Citation] [PDF] [PDF Plus]
69. Brenden Epps, David Greeley. A Quasi-Continuous Vortex Lattice Method for Unsteady Aerodynamics Analysis . [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

70. Jake Quenzer, Bijan Barzgaran, Mehran Mesbahi, Kristi Morgansen. The Generic Wide Body Aircraft Model . [Citation] [PDF] [PDF Plus]
71. Max M. Opgenoord, Mark Drela, Karen E. Willcox. Influence of Transonic Flutter on the Conceptual Design of Next-Generation Transport Aircraft . [Citation] [PDF] [PDF Plus]
72. Guilherme C. Barbosa, Rafael Bertolin, Pedro J. González, Antonio Bernardo Guimaraes Neto, Flavio J. Silvestre. Fuzzy Gain-Scheduling Applied for a Very Flexible Aircraft . [Citation] [PDF] [PDF Plus]
73. Sicheng He, Eirikur Jonsson, Charles A. Mader, Joaquim Martins. A Coupled Newton--Krylov Time Spectral Solver for Flutter Prediction . [Citation] [PDF] [PDF Plus]
74. Sandilya Kambampati, Scott Townsend, Hyunsun A. Kim. Aeroelastic Level Set Topology Optimization for a 3D Wing . [Citation] [PDF] [PDF Plus]
75. Thiemo M. Kier. An Integrated Modelling Approach for Flight Dynamics, Manoeuvre- and Gust-Loads Analysis . [Citation] [PDF] [PDF Plus]
76. A. Castrichini, J. E. Cooper, T. Benoit, Y. Lemmens. 2018. Gust and Ground Loads Integration for Aircraft Landing Loads Prediction. *Journal of Aircraft* **55**:1, 184-194. [Abstract] [Full Text] [PDF] [PDF Plus]
77. Mohamed Mahran, Adel ELsabbagh, Hani Negm. 2017. A comparison between different finite elements for elastic and aero-elastic analyses. *Journal of Advanced Research* **8**:6, 635-648. [Crossref]
78. Weigang Yao, Simão Marques. 2017. Application of a high-order CFD harmonic balance method to nonlinear aeroelasticity. *Journal of Fluids and Structures* **74**, 427-444. [Crossref]
79. Tarcísio Marinelli Pereira Silva, Carlos De Marqui. 2017. Self-powered active control of elastic and aeroelastic oscillations using piezoelectric material. *Journal of Intelligent Material Systems and Structures* **28**:15, 2023-2035. [Crossref]
80. Sang Wu, Eli Livne. 2017. Alternative Aerodynamic Uncertainty Modeling Approaches for Flutter Reliability Analysis. *AIAA Journal* **55**:8, 2808-2823. [Abstract] [Full Text] [PDF] [PDF Plus]
81. Marco Berci, Marcello Righi. 2017. An enhanced analytical method for the subsonic indicial lift of two-dimensional aerofoils – with numerical cross-validation. *Aerospace Science and Technology* **67**, 354-365. [Crossref]
82. Philipp Bekemeyer, Reik Thormann, Sebastian Timme. 2017. Frequency-Domain Gust Response Simulation Using Computational Fluid Dynamics. *AIAA Journal* **55**:7, 2174-2185. [Abstract] [Full Text] [PDF] [PDF Plus]
83. Philipp Bekemeyer, Sebastian Timme. Reduced Order Transonic Aeroelastic Gust Response Simulation of Large Aircraft . [Citation] [PDF] [PDF Plus]
84. Eirikur Jonsson, Gaetan K. Kenway, Graeme Kennedy, Joaquim Martins. Development of Flutter Constraints for High-fidelity Aerostructural Optimization . [Citation] [PDF] [PDF Plus]
85. Haojie Liu, Rui Huang, Yonghui Zhao, Haiyan Hu. 2017. Reduced-Order Modeling of Unsteady Aerodynamics for an Elastic Wing with Control Surfaces. *Journal of Aerospace Engineering* **30**:3, 04016083. [Crossref]
86. . Finite Wings 503-553. [Crossref]
87. A. Castrichini, J. E. Cooper, T. Wilson, A. Carrella, Y. Lemmens. 2017. Nonlinear Negative Stiffness Wingtip Spring Device for Gust Loads Alleviation. *Journal of Aircraft* **54**:2, 627-641. [Abstract] [Full Text] [PDF] [PDF Plus]
88. Ying Bi, Changchuan Xie, Chao An, Chao Yang. 2017. Gust load alleviation wind tunnel tests of a large-aspect-ratio flexible wing with piezoelectric control. *Chinese Journal of Aeronautics* **30**:1, 292-309. [Crossref]
89. Clayton R. Marqui, Douglas D. Bueno, Luiz C.S. Goes, Paulo J.P. Gonçalves. 2017. A reduced order state space model for aeroelastic analysis in time domain. *Journal of Fluids and Structures* **69**, 428-440. [Crossref]
90. Sang Wu, Eli Livne. Uncertainty Analysis of Flutter Predictions With Focus on the AGARD 445.6 Wing . [Citation] [PDF] [PDF Plus]
91. Johan Boutet, Grigorios Dimitriadis. Time domain analytical unsteady aerodynamic modelling for finite wings . [Citation] [PDF] [PDF Plus]
92. Carmine Valente, Christopher Wales, Dorian Jones, Ann Gaitonde, Jonathan E. Cooper, Yves Lemmens. A Doublet-Lattice Method Correction Approach for High Fidelity Gust Loads Analysis . [Citation] [PDF] [PDF Plus]
93. Robert J. Simpson, Rafael Palacios, Salvatore Maraniello. State-space realizations of potential-flow unsteady aerodynamics with
 arbitrary kinematics . [Citation] [PDF] [PDF Plus]
94. Ferran Marti, Feng Liu. Multiple Equilibrium Points of Airfoil Flutter in Viscous Flow . [Citation] [PDF] [PDF Plus]
95. Flávio J. Silvestre, Antônio B. Guimarães Neto, Rafael Mendes Bertolin, Roberto Gil Annes da Silva, Pedro Paglione. 2017. Aircraft Control Based on Flexible Aircraft Dynamics. *Journal of Aircraft* **54**:1, 262-271. [Abstract] [Full Text] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

96. Jize Zhong, Zili Xu. 2016. Coupled fluid structure analysis for wing 445.6 flutter using a fast dynamic mesh technology. *International Journal of Computational Fluid Dynamics* **30**:7-10, 531-542. [Crossref]
97. Rauno Cavallaro, Luciano Demasi. 2016. Challenges, Ideas, and Innovations of Joined-Wing Configurations: A Concept from the Past, an Opportunity for the Future. *Progress in Aerospace Sciences* **87**, 1-93. [Crossref]
98. A. Castrichini, V. Hodigere Siddaramaiah, D. E. Calderon, J. E. Cooper, T. Wilson, Y. Lemmens. 2016. Nonlinear Folding Wing Tips for Gust Loads Alleviation. *Journal of Aircraft* **53**:5, 1391-1399. [Abstract] [Full Text] [PDF] [PDF Plus]
99. Rui Huang, Yonghui Zhao, Haiyan Hu. 2016. Wind-Tunnel Tests for Active Flutter Control and Closed-Loop Flutter Identification. *AIAA Journal* **54**:7, 2089-2099. [Abstract] [Full Text] [PDF] [PDF Plus]
100. Jennifer Heeg, Pawel Chwalowski, Daniella E. Raveh, Adam Jirasek, Mats Dalenbring. Overview and Data Comparisons from the 2nd Aeroelastic Prediction Workshop . [Citation] [PDF] [PDF Plus]
101. Guilherme R. Begnini, Cleber Spode, Aluisio V. Pantaleao, Bruno Guaraldo, Guilherme D. Marcório, Marcos H. Pedras, Carlos A. Bones. A Comparison of CFD and AIC-Based Methods for Unsteady Aerodynamics and Flutter Computations of the AEPW-2 Wing Model . [Citation] [PDF] [PDF Plus]
102. Markus Ritter, Jens Neumann, Wolf Reiner Krüger. 2016. Aeroelastic Simulations of High Reynolds Number Aero Structural Dynamics Wind Tunnel Model. *AIAA Journal* **54**:6, 1962-1973. [Abstract] [Full Text] [PDF] [PDF Plus]
103. Michele Castellani, Yves Lemmens, Jonathan E. Cooper. 2016. Parametric reduced order model approach for rapid dynamic loads prediction. *Aerospace Science and Technology* **52**, 29-40. [Crossref]
104. I. Tartaruga, J. E. Cooper, M. H. Lowenberg, P. Sartor, S. Coggon, Y. Lemmens. 2016. Prediction and uncertainty propagation of correlated time-varying quantities using surrogate models. *CEAS Aeronautical Journal* **7**:1, 29-42. [Crossref]
105. Bo Tang, Zhigang Wu, Chao Yang. 2016. Aeroelastic scaling laws for gust load alleviation control system. *Chinese Journal of Aeronautics* **29**:1, 76-90. [Crossref]
106. Eli Livne, Sang Wu. Alternative Unsteady Aerodynamic Uncertainty Modeling Approaches for Aeroservoelastic Reliability Analysis . [Citation] [PDF] [PDF Plus]
107. Philipp Bekemeyer, Sebastian Timme. Reduced Order Gust Response Simulation using Computational Fluid Dynamics . [Citation] [PDF] [PDF Plus]
108. Andrea Castrichini, Jonathan E. Cooper, Thomas Wilson, Alessandro Carrella, Yves Lemmens. Nonlinear Negative Stiffness Wing-Tip Spring Device for Gust Loads Alleviation . [Citation] [PDF] [PDF Plus]
109. Carmine Valente, Dorian Jones, Ann Gaitonde, Jonathan E. Cooper, Yves Lemmens. Doublet-Lattice Method Correction by Means of Linearised Frequency Domain Solver Analysis . [Citation] [PDF] [PDF Plus]
110. Aditya Kotikalpudi, Harald Pfifer, Peter Seiler. Sensitivity of Robust Flutter Boundary to Model Uncertainties in Aeroservoelastic Systems - Invited . [Citation] [PDF] [PDF Plus]
111. Brian P. Danowsky, Philip C. Schulze. Control Surface Buffet Load Measurement using Aircraft Actuators . [Citation] [PDF] [PDF Plus]
112. Anne Hebler, Reik Thormann. Flutter Prediction of a Laminar Airfoil Using a Doublet Lattice Method Corrected by Experimental Data 445-455. [Crossref]
113. Ülgen Gülçat. Subsonic and Supersonic Flows 137-180. [Crossref]
114. Changchuan Xie, Yi Liu, Chao Yang, J. E. Cooper. 2016. Geometrically Nonlinear Aeroelastic Stability Analysis and Wind Tunnel Test Validation of a Very Flexible Wing. *Shock and Vibration* **2016**, 1-17. [Crossref]
115. Federico Fonte, Sergio Ricci, Paolo Mantegazza. 2015. Gust Load Alleviation for a Regional Aircraft Through a Static Output Feedback. *Journal of Aircraft* **52**:5, 1559-1574. [Abstract] [Full Text] [PDF] [PDF Plus]
116. Rupanshi Chhabra, Sameer B. Mulani, Rakesh K. Kapania, Joseph A. Schetz. Control Power Optimization using Artificial Intelligence for Hybrid Wing Body Aircraft . [Citation] [PDF] [PDF Plus]
117. Lars Reimer, Markus Ritter, Ralf Heinrich, Wolf Krüger. CFD-based Gust Load Analysis for a Free-flying Flexible Passenger Aircraft in Comparison to a DLM-based Approach . [Citation] [PDF] [PDF Plus]
118. Aditya Kotikalpudi, Harald Pfifer, Gary J. Balas. Unsteady Aerodynamics Modeling for a Flexible Unmanned Air Vehicle . [Citation] [PDF] [PDF Plus]
119. Shijun Guo, Jaime De Los Monteros, Ying Liu. 2015. Gust Alleviation of a Large Aircraft with a Passive Twist Wingtip. *Aerospace* **2**:2, 135-154. [Crossref]
120. Rui Huang, Wenmin Qian, Haiyan Hu, Yonghui Zhao. 2015. Design of active flutter suppression and wind-tunnel tests of a wing model involving a control delay. *Journal of Fluids and Structures* **55**, 409-427. [Crossref]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

121. . References 535-538. [Crossref]

122. Mohamed Mahran, Hani Negm, Adel El-Sabbagh. 2015. Aero-elastic characteristics of tapered plate wings. *Finite Elements in Analysis and Design* **94**, 24-32. [Crossref]

123. Thiemo M. Kier. Integrated Flexible Dynamic Maneuver Loads Models based on Aerodynamic Influence Coefficients of a 3D Panel Method . [Citation] [PDF] [PDF Plus]

124. Ruben Moreno, Fedime von Knoblauch, Raj Narisetti, Paul F. Taylor. A Modification to the Enhanced Correction Factor Technique to Correlate With Experimental Data . [Citation] [PDF] [PDF Plus]

125. Andrea Castrichini, Vijaya Hodigere Siddaramaiah, Dario Calderon, Jonathan E. Cooper, Thomas Wilson, Yves Lemmens. Nonlinear Folding Wing-Tips for Gust Loads Alleviation . [Citation] [PDF] [PDF Plus]

126. Irene Tartaruga, Pia Sartor, Jonathan E. Cooper, Simon Coggon, Yves Lemmens. Efficient Prediction and Uncertainty Propagation of Correlated Loads . [Citation] [PDF] [PDF Plus]

127. Harald Pfifer, Claudia P. Moreno, Julian Theis, Aditya Kotikapuldi, Abhineet Gupta, Bela Takarics, Peter Seiler. 2015. Linear Parameter Varying Techniques Applied to Aeroservoelastic Aircraft: In Memory of Gary Balas. *IFAC-PapersOnLine* **48**:26, 103-108. [Crossref]

128. Reik Thormann, Diliana Dimitrov. 2014. Correction of aerodynamic influence matrices for transonic flow. *CEAS Aeronautical Journal* **5**:4, 435-446. [Crossref]

129. Rémi Arnaud, Fabrice Poirion. 2014. Stochastic annealing optimization of uncertain aeroelastic system. *Aerospace Science and Technology* **39**, 456-464. [Crossref]

130. Joseba Murua, Pablo Martínez, Héctor Climent, Louw van Zyl, Rafael Palacios. 2014. T-tail flutter: Potential-flow modelling, experimental validation and flight tests. *Progress in Aerospace Sciences* **71**, 54-84. [Crossref]

131. Henrik Hesse, Rafael Palacios. 2014. Reduced-Order Aeroelastic Models for Dynamics of Maneuvering Flexible Aircraft. *AIAA Journal* **52**:8, 1717-1732. [Abstract] [Full Text] [PDF] [PDF Plus]

132. Antônio B. Guimarães Neto, Roberto G.A. da Silva, Pedro Paglione. 2014. Control-point-placement method for the aerodynamic correction of the vortex- and the doublet-lattice methods. *Aerospace Science and Technology* **37**, 117-129. [Crossref]

133. Alfonso Pagani, Marco Petrolo, Erasmo Carrera. 2014. Flutter analysis by refined 1D dynamic stiffness elements and doublet lattice method. *Advances in aircraft and spacecraft science* **1**:3, 291-310. [Crossref]

134. Altan Kayran, Mehmet O. Nalci. Aeroservoelastic Modeling and Analysis of a Missile Control Surface with a Nonlinear Electromechanical Actuator . [Citation] [PDF] [PDF Plus]

135. Graeme Kennedy, Gaetan Kenway, Joaquim Martins. Towards Gradient-Based Design Optimization of Flexible Transport Aircraft with Flutter Constraints . [Citation] [PDF] [PDF Plus]

136. Aditya Kotikalpudi, Claudia Moreno, Brian Taylor, Harald Pfifer, Gary Balas. Low cost development of a nonlinear simulation for a flexible uninhabited air vehicle 2029-2034. [Crossref]

137. R. Arnaud, F. Poirion. 2014. Optimization of an Uncertain Aeroelastic System Using Stochastic Gradient Approaches. *Journal of Aircraft* **51**:3, 1061-1066. [Citation] [Full Text] [PDF] [PDF Plus]

138. H. Haddad Khodaparast, J. E. Cooper. 2014. Rapid Prediction of Worst-Case Gust Loads Following Structural Modification. *AIAA Journal* **52**:2, 242-254. [Abstract] [Full Text] [PDF] [PDF Plus]

139. Jennifer Heeg. Unsteady aerodynamic validation experiences from the Aeroelastic Prediction Workshop . [Citation] [PDF] [PDF Plus]

140. David L. Rodriguez, Michael J. Aftosmis, Marian Nemec, Stephen C. Smith. Static Aeroelastic Analysis with an Inviscid Cartesian Method . [Citation] [PDF] [PDF Plus]

141. M. Belardo, N. Paletta, L. Di Palma, M. Pecora. 2014. Structural and Aeroelastic Design of a Joined-Wing UAV. *Journal of Aerospace Engineering* **27**:1, 93-111. [Crossref]

142. Reik Thormann, Markus Widhalm. 2013. Linear-Frequency-Domain Predictions of Dynamic-Response Data for Viscous Transonic Flows. *AIAA Journal* **51**:11, 2540-2557. [Abstract] [Full Text] [PDF] [PDF Plus]

143. Rui Huang, Haiyan Hu, Yonghui Zhao. 2013. Nonlinear aeroservoelastic analysis of a controlled multiple-actuated-wing model with free-play. *Journal of Fluids and Structures* **42**, 245-269. [Crossref]

144. Marika Belardo, Modesto Pecora, Nicola Paletta. Flutter Analysis with Hydraulic Servos -a Technique for Modeling Actuator Dynamics . [Crossref]

145. Charbel Farhat, Edmond Kwan-yu Chiu, David Amsallem, Jean-Sébastien Schotté, Roger Ohayon. 2013. Modeling of Fuel Sloshing and its Physical Effects on Flutter. *AIAA Journal* **51**:9, 2252-2265. [Abstract] [Full Text] [PDF] [PDF Plus]

146. Mostafa S.A. El Sayed, Miguel Alejandro Gutierrez Contreras, Nicholas Stathopoulos. 2013. Monitor Points Method for Loads Recovery in Static/Dynamic Aeroelasticity Analysis with Hybrid Airframe Representation. *SAE International Journal of Aerospace* **6**:2, 399-407. [Crossref]

147. Robert J. S. Simpson, Rafael Palacios, Joseba Murua. 2013. Induced-Drag Calculations in the Unsteady Vortex Lattice Method. *AIAA Journal* **51**:7, 1775-1779. [Citation] [Full Text] [PDF] [PDF Plus]

148. Pratik Shrestha, Min-Soo Jeong, In Lee, Jae-Sung Bae, Kyo-Nam Koo. 2013. Flutter Characteristics of a Morphing Flight Vehicle with Varying Inboard and Outboard Folding Angles. *International Journal of Aeronautical and Space Sciences* **14**:2, 133-139. [Crossref]

149. Robert J. Simpson, Rafael Palacios. Numerical aspects of nonlinear flexible aircraft flight dynamics modeling . [Citation] [PDF] [PDF Plus]

150. Tarcisio M. Silva, Carlos De Marqui. Vibration Suppression of a Plate-Like Wing Under Atmospheric Turbulence Using Passive And Hybrid Piezoelectric Circuits . [Citation] [PDF] [PDF Plus]

151. Henrik Hesse, Rafael Palacios. Model Reduction in Flexible-Aircraft Dynamics with Large Rigid-Body Motion . [Citation] [PDF] [PDF Plus]

152. Brian Danowsky, Peter M. Thompson, Sunil Kukreja. 2013. Nonlinear Analysis of Aeroservoelastic Models with Free Play Using Describing Functions. *Journal of Aircraft* **50**:2, 329-336. [Abstract] [Full Text] [PDF] [PDF Plus]

153. L. Cavagna, A. De Gaspari, L. Riccobene, S. Ricci. 2013. NeoCASS+, A Conceptual Design and Simulation Framework for Morphing Aircraft. *Aerotecnica Missili & Spazio* **92**:1-2, 52-60. [Crossref]

154. M. Petrolo. 2013. Flutter analysis of composite lifting surfaces by the 1D Carrera Unified Formulation and the doublet lattice method. *Composite Structures* **95**, 539-546. [Crossref]

155. D. M. De Leon, C. E. de Souza, J. S. O. Fonseca, R. G. A. da Silva. 2012. Aeroelastic tailoring using fiber orientation and topology optimization. *Structural and Multidisciplinary Optimization* **46**:5, 663-677. [Crossref]

156. Joseba Murua, Rafael Palacios, J. Michael R. Graham. 2012. Applications of the unsteady vortex-lattice method in aircraft aeroelasticity and flight dynamics. *Progress in Aerospace Sciences* **55**, 46-72. [Crossref]

157. K. V. Avramov, E. A. Strel'nikova, C. Pierre. 2012. Resonant many-mode periodic and chaotic self-sustained aeroelastic vibrations of cantilever plates with geometrical non-linearities in incompressible flow. *Nonlinear Dynamics* **70**:2, 1335-1354. [Crossref]

158. Rui Huang, Haiyan Hu, Yonghui Zhao. 2012. Designing active flutter suppression for high-dimensional aeroelastic systems involving a control delay. *Journal of Fluids and Structures* **34**, 33-50. [Crossref]

159. . Multidisciplinary Airframe Design Process: Incorporation of steady and unsteady aeroelastic loads . [Citation] [PDF] [PDF Plus]

160. Marco Petrolo. 2012. Advanced 1D Structural Models for Flutter Analysis of Lifting Surfaces. *International Journal of Aeronautical and Space Sciences* **13**:2, 199-209. [Crossref]

161. Henrik Hesse, Joseba Murua, Rafael Palacios. Consistent Structural Linearization in Flexible Aircraft Dynamics with Large Rigid-Body Motion . [Citation] [PDF] [PDF Plus]

162. Ruben Moreno, Paul Taylor, Jerry Newsom. A Rigid Horizontal Tail Wind Tunnel Test for High Transonic Mach and High Frequency Unsteady Pressure Acquisition . [Citation] [PDF] [PDF Plus]

163. Joseba Murua, Rafael Palacios, J.m.r. Graham. Open-Loop Stability and Closed-Loop Gust Alleviation on Flexible Aircraft Including Wake Modeling . [Citation] [PDF] [PDF Plus]

164. Hamed Khodaparast, Jonathan Cooper. Rapid Prediction of Worst Case Gust Loads Following Structural Modification . [Citation] [PDF] [PDF Plus]

165. Ralph Voss, Reik Thormann. Flutter Computations for a Generic Reference Aircraft Adopting CFD and Reduced Order Methods . [Citation] [PDF] [PDF Plus]

166. Samarth Bhasin, Ping Chen, Zhicun Wang, Luciano Demasi. Dynamic Nonlinear Aeroelastic Analysis of the Joined Wing Configuration . [Citation] [PDF] [PDF Plus]

167. P.-O. Persson, D.J. Willis, J. Peraire. 2012. Numerical simulation of flapping wings using a panel method and a high-order Navier-Stokes solver. *International Journal for Numerical Methods in Engineering* **89**:10, 1296-1316. [Crossref]

168. N. Divoux, A. Frediani. The Lifting System of a PrandtlPlane, Part 2: Preliminary Study on Flutter Characteristics 235-267. [Crossref]

169. Yonghui Zhao, Haiyan Hu. 2012. Parameterized aeroelastic modeling and flutter analysis for a folding wing. *Journal of Sound and Vibration* **331**:2, 308-324. [Crossref]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

170. Koji ISOGAI, Hisanori ABIRU. 2012. Study of Multi-Wing Configurations of Elastically Supported Flapping Wing Power Generator. *TRANSACTIONS OF THE JAPAN SOCIETY FOR AERONAUTICAL AND SPACE SCIENCES* **55**:2, 133-142. [Crossref]

171. L. Cavagna, S. Ricci, L. Riccobene. 2011. Structural Sizing, Aeroelastic Analysis, and Optimization in Aircraft Conceptual Design. *Journal of Aircraft* **48**:6, 1840-1855. [Citation] [PDF] [PDF Plus]

172. Luca Cavagna, Sergio Ricci, Lorenzo Travaglini. 2011. NeoCASS: An integrated tool for structural sizing, aeroelastic analysis and MDO at conceptual design level. *Progress in Aerospace Sciences* **47**:8, 621-635. [Crossref]

173. Moriz Scharpenberg, Thiemo Kier, Laila Taules. Considerations on an Integral Flight Physics Model with Application to Loads Analysis . [Crossref]

174. Ning YANG, Zhigang WU, Chao YANG. 2011. Structural Nonlinear Flutter Characteristics Analysis for an Actuator-fin System with Dynamic Stiffness. *Chinese Journal of Aeronautics* **24**:5, 590-599. [Crossref]

175. A. Attaran, D.L. Majid, S. Basri, A.S. Mohd Rafie, E.J. Abdullah. 2011. Structural optimization of an aeroelastically tailored composite flat plate made of woven fiberglass/epoxy. *Aerospace Science and Technology* **15**:5, 393-401. [Crossref]

176. K.J. Badcock, S. Timme, S. Marques, H. Khodaparast, M. Prandina, J.E. Mottershead, A. Swift, A. Da Ronch, M.A. Woodgate. 2011. Transonic aeroelastic simulation for instability searches and uncertainty analysis. *Progress in Aerospace Sciences* **47**:5, 392-423. [Crossref]

177. S. Timme, S. Marques, K. J. Badcock. 2011. Transonic Aeroelastic Stability Analysis Using a Kriging-Based Schur Complement Formulation. *AIAA Journal* **49**:6, 1202-1213. [Citation] [PDF] [PDF Plus]

178. Louw H. van Zyl, Edward H. Mathews. 2011. Aeroelastic Analysis of T-Tails Using an Enhanced Doublet Lattice Method. *Journal of Aircraft* **48**:3, 823-831. [Citation] [PDF] [PDF Plus]

179. William P. Rodden. 2011. Frequency Dependence of ZONA6. *Journal of Aircraft* **48**:3, 1116-1118. [Citation] [PDF] [PDF Plus]

180. Joseba Murua, Henrik Hesse, Rafael Palacios, J. Michael R. Graham. Stability and Open-Loop Dynamics of Very Flexible Aircraft Including Free-Wake Effects . [Citation] [PDF] [PDF Plus]

181. Luca Cavagna, Sergio Ricci, Lorenzo Travaglini. Aeroelastic Analysis and Optimization at Conceptual Design Level Using NeoCASS Suite . [Citation] [PDF] [PDF Plus]

182. Carlos De Marqui, Wander G. R. Vieira, Alper Erturk, Daniel J. Inman. 2011. Modeling and Analysis of Piezoelectric Energy Harvesting From Aeroelastic Vibrations Using the Doublet-Lattice Method. *Journal of Vibration and Acoustics* **133**:1. . [Crossref]

183. Nicola Paletta, Marika Belardo, Modesto Pecora. 2010. Load Alleviation on a Joined-Wing Unmanned Aircraft. *Journal of Aircraft* **47**:6, 2005-2016. [Citation] [PDF] [PDF Plus]

184. C. Eloy, O. Doaré, L. Duchemin, L. Schouveiler. 2010. A Unified Introduction to Fluid Mechanics of Flying and Swimming at High Reynolds Number. *Experimental Mechanics* **50**:9, 1361-1366. [Crossref]

185. Luca Cavagna, Sergio Ricci, Lorenzo Travaglini. Structural Sizing and Aeroelastic Optimization in Aircraft Conceptual Design using NeoCASS suite . [Citation] [PDF] [PDF Plus]

186. Raymond Kolonay, Marcelo Kobayashi. Topology, Shape, and Sizing Optimization of Aircraft Lifting Surfaces Using a Cellular Division Method . [Citation] [PDF] [PDF Plus]

187. Ögmundur Petersson, Martin Leitner, Felix Stroscher. Structural Optimization Framework for Aircraft Subject to Transient Maneuver and Gust Loads . [Citation] [PDF] [PDF Plus]

188. Joseba Murua, Rafael Palacios, John Michael Graham. Modeling of Nonlinear Flexible Aircraft Dynamics Including Free-Wake Effects . [Citation] [PDF] [PDF Plus]

189. S. Timme, S. Marques, K. Badcock. Transonic Aeroelastic Stability Analysis Using a Kriging-Based Schur Complement Formulation . [Citation] [PDF] [PDF Plus]

190. Luca Cavagna, Sergio Ricci, Lorenzo Travaglini. NeoCASS: An Integrated Tool for Structural Sizing, Aeroelastic Analysis and MDO at Conceptual Design Level . [Citation] [PDF] [PDF Plus]

191. R. Huang, W. M. Qian, Y. H. Zhao, H. Y. Hu. 2010. Flutter Analysis: Using Piecewise Quadratic Interpolation with Mode Tracking and Wind-Tunnel Tests. *Journal of Aircraft* **47**:4, 1447-1451. [Citation] [PDF] [PDF Plus]

192. Jonathan Cooper, Afzal Suleman, Sergio Ricci, S. Miller, G. Vio, G. Vio, L. da Luz, A. Gomes, F. Lau, L. Cavagna, A. De Gaspari, L. Riccobene, A. Scotti, M. Terraneo. SMorph - Smart Aircraft Morphing Technologies Project . [Citation] [PDF] [PDF Plus]

193. Hamed Haddad Khodaparast, John E. Mottershead, Kenneth J. Badcock. 2010. Propagation of structural uncertainty to linear aeroelastic stability. *Computers & Structures* **88**:3-4, 223-236. [Crossref]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

194. L. Cavagna, S. Ricci, A. Scotti. 2009. Active aeroelastic control over a four control surface wing model. *Aerospace Science and Technology* **13**:7, 374-382. [Crossref]

195. A. V. Balakrishnan. 2009. Analytical Solution of the Possio Integral Equation for the Sonic Case. *Journal of Aerospace Engineering* **22**:4, 434-437. [Crossref]

196. Y. H. Zhao, H. Y. Hu. 2009. Active Control of Vertical Tail Buffeting by Piezoelectric Actuators. *Journal of Aircraft* **46**:4, 1167-1175. [Citation] [PDF] [PDF Plus]

197. Mattia Mattaboni, Giuseppe Quaranta, Paolo Mantegazza. 2009. Active Flutter Suppression for a Three-Surface Transport Aircraft by Recurrent Neural Networks. *Journal of Guidance, Control, and Dynamics* **32**:4, 1295-1307. [Citation] [PDF] [PDF Plus]

198. Y.H. Zhao. 2009. Flutter suppression of a high aspect-ratio wing with multiple control surfaces. *Journal of Sound and Vibration* **324**:3-5, 490-513. [Crossref]

199. Ögmundur Petersson. Optimization of Aircraft Wings Including Dynamic Aeroelasticity and Manufacturing Aspects . [Citation] [PDF] [PDF Plus]

200. Luca Cavagna, Sergio Ricci, Luca Riccobene. A Fast Tool for Structural Sizing, Aeroelastic Analysis and Optimization in Aircraft Conceptual Design . [Citation] [PDF] [PDF Plus]

201. Sebastian Heinze, Ulf Ringertz, Dan Borglund. 2009. Assessment of Uncertain External Store Aerodynamics Using mu-p Flutter Analysis. *Journal of Aircraft* **46**:3, 1062-1068. [Citation] [PDF] [PDF Plus]

202. Ju Qiu, Qin Sun. Research of aerodynamic load of horizontal tail 1503-1506. [Crossref]

203. Luciano Demasi, Eli Livne. 2009. Dynamic Aeroelasticity of Structurally Nonlinear Configurations Using Linear Modally Reduced Aerodynamic Generalized Forces. *AIAA Journal* **47**:1, 70-90. [Citation] [PDF] [PDF Plus]

204. Z. Feng, A. Soulaı¨mani, Y. Saad. 2009. Nonlinear Krylov acceleration for CFD-based aeroelasticity. *Journal of Fluids and Structures* **25**:1, 26-41. [Crossref]

205. Dan Borglund. 2008. Robust Eigenvalue Analysis Using the Structured Singular Value: The μ-p Flutter Method. *AIAA Journal* **46**:11, 2806-2813. [Citation] [PDF] [PDF Plus]

206. Luca Cavagna, Sergio Ricci, Luca Riccobene, Adrien Bérard, Arthur Rizzi. A Fast MDO Tool for Aeroelastic Optimization in Aircraft Conceptual Design . [Citation] [PDF] [PDF Plus]

207. John W. Edwards, Carol D. Wieseman. 2008. Flutter and Divergence Analysis Using the Generalized Aeroelastic Analysis Method. *Journal of Aircraft* **45**:3, 906-915. [Citation] [PDF] [PDF Plus]

208. Ranjan Vepa. 2008. Aeroelastic Analysis of Wing Structures Using Equivalent Plate Models. *AIAA Journal* **46**:5, 1216-1225. [Citation] [PDF] [PDF Plus]

209. Soumitra Banerjee, Mayuresh Patil. Aeroelastic Analysis of Membrane Wings . [Citation] [PDF] [PDF Plus]

210. Hitoshi Arizono, Hamid Reza Kheirandish, Jiro Nakamichi, Hiroyuki Morino. Transonic Flutter Simulation for Wing-Pylon-Nacelle Configuration Using Navier-Stokes Equations . [Citation] [PDF] [PDF Plus]

211. P. Vitiello, S. De Rosa, F. Franco. 2008. Convected field analysis of flat panels response to turbulent boundary layer induced excitation. *Aerospace Science and Technology* **12**:1, 91-104. [Crossref]

212. Koji Isogai, Yohei Harino. 2007. Optimum Aeroelastic Design of a Flapping Wing. *Journal of Aircraft* **44**:6, 2040-2048. [Citation] [PDF] [PDF Plus]

213. Kazuhisa Chiba, Akira Oyama, Shigeru Obayashi, Kazuhiro Nakahashi, Hiroyuki Morino. 2007. Multidisciplinary Design Optimization and Data Mining for Transonic Regional-Jet Wing. *Journal of Aircraft* **44**:4, 1100-1112. [Citation] [PDF] [PDF Plus]

214. Thuan Lieu, Charbel Farhat. 2007. Adaptation of Aeroelastic Reduced-Order Models and Application to an F-16 Configuration. *AIAA Journal* **45**:6, 1244-1257. [Citation] [PDF] [PDF Plus]

215. M.J. de C. Henshaw, K.J. Badcock, G.A. Vio, C.B. Allen, J. Chamberlain, I. Kaynes, G. Dimitriadis, J.E. Cooper, M.A. Woodgate, A.M. Rampurawala, D. Jones, C. Fenwick, A.L. Gaitonde, N.V. Taylor, D.S. Amor, T.A. Eccles, C.J. Denley. 2007. Non-linear aeroelastic prediction for aircraft applications. *Progress in Aerospace Sciences* **43**:4-6, 65-137. [Crossref]

216. Mattia Mattaboni, Giuseppe Quaranta, Paolo Mantegazza. Active flutter suppression for a three surface transport aircraft by recurrent neural networks . [Citation] [PDF] [PDF Plus]

217. Brijesh Raghavan, Mayuresh Patil. Aeroelasticity and Flight Dynamics of Oblique Flying Wings . [Citation] [PDF] [PDF Plus]

218. David Amsallem, Charbel Farhat, Thuan Lieu. Aeroelastic Analysis of F-16 and F-18/A Configurations Using Adapted CFD-Based Reduced-Order Models . [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

219. Alan G. Sherwood. 2007. Case of Explosive Wing-Flaperon Flutter. *Journal of Aircraft* **44**:2, 606-610. [Citation] [PDF] [PDF Plus]
220. Thuan Lieu, Charbel Farhat. Aerodynamic Parameter Adaptation of CFD-Based Reduced-Order Models . [Citation] [PDF] [PDF Plus]
221. Eriko SHIMIZU, Shinkyu JEONG, Shigeru OBAYASHI, Koji ISOGAI. 2007. Visualization of the Design Space of a Caudal Fin with Hydro-Elastic Effect. *Journal of Fluid Science and Technology* **2**:1, 163-174. [Crossref]
222. Sebastian Heinze, Moti Karpel. 2006. Analysis and Wind Tunnel Testing of a Piezoelectric Tab for Aeroelastic Control Applications. *Journal of Aircraft* **43**:6, 1799-1804. [Citation] [PDF] [PDF Plus]
223. T. Lieu, C. Farhat, M. Lesoinne. 2006. Reduced-order fluid/structure modeling of a complete aircraft configuration. *Computer Methods in Applied Mechanics and Engineering* **195**:41-43, 5730-5742. [Crossref]
224. Luciano Demasi. 2006. Induced Drag Minimization: A Variational Approach Using the Acceleration Potential. *Journal of Aircraft* **43**:3, 669-680. [Citation] [PDF] [PDF Plus]
225. Dario H. Baldelli, Ping C. Chen, Jose Panza. 2006. Unified Aeroelastic and Flight Dynamic Formulation via Rational Function Approximations. *Journal of Aircraft* **43**:3, 763-772. [Citation] [PDF] [PDF Plus]
226. Luciano Demasi, Eli Livne. Aeroelasticity of Structurally Nonlinear Lifting Surfaces Using Linear Modally Reduced Aerodynamic Generalized Forces . [Citation] [PDF] [PDF Plus]
227. David Azoulay, Moti Karpel. Characterization of Methods for Computation of Aeroservoelastic Systems Response to Gust Excitation . [Citation] [PDF] [PDF Plus]
228. G. Dietz, G. Schewe, H. Mai. 2006. Amplification and amplitude limitation of heave/pitch limit-cycle oscillations close to the transonic dip. *Journal of Fluids and Structures* **22**:4, 505-527. [Crossref]
229. Jae-Hung Han, Junji Tani, Jinhao Qiu. 2006. Active flutter suppression of a lifting surface using piezoelectric actuation and modern control theory. *Journal of Sound and Vibration* **291**:3-5, 706-722. [Crossref]
230. Thuan Lieu, Charbel Farhat. Adaptation of POD-based Aeroelastic ROMs for Varying Mach Number and Angle of Attack: Application to a Complete F-16 Configuration . [Citation] [PDF] [PDF Plus]
231. Michael R. Johnson, Jose C. Principe. 2005. Modeling and Detection of Limit-Cycle Oscillations Using Adaptable Linear Models. *Journal of Aircraft* **42**:6, 1575-1587. [Citation] [PDF] [PDF Plus]
232. David Eller, Sebastian Heinze. 2005. Approach to Induced Drag Reduction with Experimental Evaluation. *Journal of Aircraft* **42**:6, 1478-1485. [Citation] [PDF] [PDF Plus]
233. Christian Reschke. Flight Loads Analysis with Inertially Coupled Equations of Motion . [Citation] [PDF] [PDF Plus]
234. Thiemo Kier. Comparison of Unsteady Aerodynamic Modelling Methodologies with Respect to Flight Loads Analysis . [Citation] [PDF] [PDF Plus]
235. M. Karpel, B. Moulin, P. C. Chen. 2005. Extension of the g-Method Flutter Solution to Aeroservoelastic Stability Analysis. *Journal of Aircraft* **42**:3, 789-792. [Citation] [PDF] [PDF Plus]
236. Martin Carlsson. 2005. Control Surface Response of a Blended Wing Body Aeroelastic Wind-Tunnel Model. *Journal of Aircraft* **42**:3, 738-742. [Citation] [PDF] [PDF Plus]
237. Ping Chen, Roberto Silva, Danny Liu. Transonic AIC Weighting Method Using Successive Kernel Expansion . [Citation] [PDF] [PDF Plus]
238. Luciano Demasi, Eli Livne. Exploratory Studies of Joined-Wing Aeroelasticity . [Citation] [PDF] [PDF Plus]
239. Thuan Lieu, Charbel Farhat, Michel Lesoinne. POD-based Aeroelastic Analysis of a Complete F-16 Configuration: ROM Adaptation and Demonstration . [Citation] [PDF] [PDF Plus]
240. Charles Denegri, James Dubben. F-16 Limit Cycle Oscillation Analysis Using Transonic Small-disturbance Theory . [Citation] [PDF] [PDF Plus]
241. Charles M. Denegri Jr., James A. Dubben, Daniel L. Maxwell. 2005. In-Flight Wing Deformation Characteristics During Limit Cycle Oscillations. *Journal of Aircraft* **42**:2, 500-508. [Citation] [PDF] [PDF Plus]
242. Hitoshi Arizono, Koji Isogai. 2005. Application of Genetic Algorithm for Aeroelastic Tailoring of a Cranked-Arrow Wing. *Journal of Aircraft* **42**:2, 493-499. [Citation] [PDF] [PDF Plus]
243. Dan Borglund. 2005. Upper Bound Flutter Speed Estimation Using the mu-k Method. *Journal of Aircraft* **42**:2, 555-557. [Citation] [PDF] [PDF Plus]
244. Chao Gao, Shuchi Yang, Shijun Luo, Feng Liu, David M. Schuster. 2005. Calculation of Airfoil Flutter by an Euler Method with Approximate Boundary Conditions. *AIAA Journal* **43**:2, 295-305. [Citation] [PDF] [PDF Plus]
245. V. D. Chuban. 2005. Influence of Angle of Attack and Stabilizer Deflection on T Empennage Flutter. *Journal of Aircraft* **42**:1, 264-268. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

246. . Nonsteady Aerodynamics of Lifting and Non-Lifting Surfaces 169-273. [Crossref]
247. Dan Patt, Li Liu, Peretz P. Friedmann. 2005. Rotorcraft Vibration Reduction and Noise Prediction Using a Unified Aeroelastic Response Simulation. *Journal of the American Helicopter Society* **50**:1, 95-106. [Crossref]
248. Dan Borglund. 2004. The mu-k Method for Robust Flutter Solutions. *Journal of Aircraft* **41**:5, 1209-1216. [Citation] [PDF] [PDF Plus]
249. M.J. Patil, D.H. Hodges. 2004. On the importance of aerodynamic and structural geometrical nonlinearities in aeroelastic behavior of high-aspect-ratio wings. *Journal of Fluids and Structures* **19**:7, 905-915. [Crossref]
250. P. C. Chen, Danny D. Liu, Darius Sarhaddi. 2004. High-Order vs Low-Order Panel Methods for Unsteady Subsonic Lifting Surfaces. *Journal of Aircraft* **41**:4, 957-959. [Citation] [PDF] [PDF Plus]
251. L. H. van Zyl, T. Ueda. 2004. Convergence of the Subsonic Doublet Point Method. *Journal of Aircraft* **41**:2, 411-412. [Citation] [PDF] [PDF Plus]
252. Chris L. Pettit, Ramana V. Grandhi. 2003. Optimization of a Wing Structure for Gust Response and Aileron Effectiveness. *Journal of Aircraft* **40**:6, 1185-1191. [Citation] [PDF] [PDF Plus]
253. E. Livne, Terrence A. Weisshaar. 2003. Aeroelasticity of Nonconventional Airplane Configurations-Past and Future. *Journal of Aircraft* **40**:6, 1047-1065. [Citation] [PDF] [PDF Plus]
254. David Eller, Martin Carlsson. 2003. An efficient aerodynamic boundary element method for aeroelastic simulations and its experimental validation. *Aerospace Science and Technology* **7**:7, 532-539. [Crossref]
255. A. V. Balakrishnan. 2003. Possio Integral Equation of Aeroelasticity Theory. *Journal of Aerospace Engineering* **16**:4, 139-154. [Crossref]
256. John Dugundji. 2003. Personal Perspective of Aeroelasticity During the Years 1953-1993. *Journal of Aircraft* **40**:5, 809-812. [Citation] [PDF] [PDF Plus]
257. Terry M. Harris, Lawrence J. Huttsell. 2003. Aeroelasticity Research at Wright-Patterson Air Force Base (Wright Field) from 1953-1993. *Journal of Aircraft* **40**:5, 813-819. [Citation] [PDF] [PDF Plus]
258. Rudy Yurkovich. 2003. Status of Unsteady Aerodynamic Prediction for Flutter of High-Performance Aircraft. *Journal of Aircraft* **40**:5, 832-842. [Citation] [PDF] [PDF Plus]
259. William P. Rodden. 2003. Methods for Calculating the Subsonic Aerodynamic Center of Finite Wings. *Journal of Aircraft* **40**:5, 1003-1003. [Citation] [PDF] [PDF Plus]
260. John Edwards, Carol Wieseman. Flutter and Divergence Analysis Using the Generalized Aeroelastic Analysis Method . [Citation] [PDF] [PDF Plus]
261. Moti Karpel, Boris Moulin, P. C. Chen. Extension of the g-Method Flutter Solution to Aeroservoelastic Stability Analysis . [Citation] [PDF] [PDF Plus]
262. Piergiovanni Marzocca, Liviu Librescu, Dong-Hyun Kim, In Lee. Linear/Nonlinear Unsteady Aerodynamic Modeling of 2-D Lifting Surfaces via a Combined CFD/Analytical Approach . [Citation] [PDF] [PDF Plus]
263. Philippe Geuzaine, Gregory Brown, Chuck Harris, Charbel Farhat. 2003. Aeroelastic Dynamic Analysis of a Full F-16 Configuration for Various Flight Conditions. *AIAA Journal* **41**:3, 363-371. [Citation] [PDF] [PDF Plus]
264. Bertil A. Winther. 2003. Analytical Representation of Aerodynamic Forces in Laplace Domain. *Journal of Aircraft* **40**:2, 395-399. [Citation] [PDF] [PDF Plus]
265. Michael R. Johnson, Charles M. Denegri Jr.. 2003. Comparison of Static and Dynamic Neural Networks for Limit Cycle Oscillation Prediction. *Journal of Aircraft* **40**:1, 194-203. [Citation] [PDF] [PDF Plus]
266. Martin Carlsson, Jakob Kuttenkeuler. 2003. Design and Testing of a Blended Wing Body Aeroelastic Wind-Tunnel Model. *Journal of Aircraft* **40**:1, 211-213. [Citation] [PDF] [PDF Plus]
267. LazĂr Dragoş. The Unsteady Flow 397-448. [Crossref]
268. Charbel Farhat, Philippe Geuzaine, Gregory Brown. 2003. Application of a three-field nonlinear fluid–structure formulation to the prediction of the aeroelastic parameters of an F-16 fighter. *Computers & Fluids* **32**:1, 3-29. [Crossref]
269. V.D. Chuban, V.I. Ivanteyev, B.J. Chudayev, E.P. Avdeyev, V.A. Shvilkin. 2002. Numerical simulation of flutter validated by flight-test data for TU-204 aircraft. *Computers & Structures* **80**:32, 2551-2563. [Crossref]
270. R.J. Zwaan, B.B. Prananta. 2002. Fluid/structure interaction in numerical aeroelastic simulation. *International Journal of Non-Linear Mechanics* **37**:4-5, 987-1002. [Crossref]
271. Piergiovanni Marzocca, Liviu Librescu, Gianfranco Chiocchia. 2002. Aeroelastic response of a 2-D airfoil in a compressible flow field and exposed to blast loading. *Aerospace Science and Technology* **6**:4, 259-272. [Crossref]
272. Terrence Weisshaar, D-H. Lee. Aeroelastic Tailoring of Joined-Wing Configurations . [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

273. Charbel Farhat, Philippe Geuzaine, Gregory Brown, Chuck Harris. Nonlinear Flutter Analysis of an F-16 in Stabilized, Accelerated, and Increased Angle of Attack Flight Conditions . [Citation] [PDF] [PDF Plus]
274. Ping-Chih Chen. Nonhomogeneous State-Space Approach for Discrete Gust Analysis of Open-Loop/Closed-Loop Aeroelastic Systems . [Citation] [PDF] [PDF Plus]
275. P. Geuzaine, G. Brown, C. Farhat. Three-field-based nonlinear aeroelastic simulation technology - Status and application to the flutter analysis of an F-16 configuration . [Citation] [PDF] [PDF Plus]
276. M. Kordt, Ch. Ballauf, H.-D. Joos. 2002. Lastenreduktion an Großflugzeugen durch aktive Bedämpfung der Koplanarbewegung des Höhenleitwerks (Load Alleviation for Large Aeroplanes by Active Mode Control of the Coplanar Motion of the Horizontal Tailplane). *at - Automatisierungstechnik* **50**:9/2002. . [Crossref]
277. Charles M. Denegri Jr., Michael R. Johnson. 2001. Limit Cycle Oscillation Prediction Using Artificial Neural Networks. *Journal of Guidance, Control, and Dynamics* **24**:5, 887-895. [Citation] [PDF] [PDF Plus]
278. David Schmidt, Frank Chavez. Systems approach to characterizing aircraft aeroelastic model variation for robust control applications . [Citation] [PDF] [PDF Plus]
279. David Schmidt, Frank Chavez. Significance of unsteady aerodynamics and structural mode shape on predicting model variation . [Citation] [PDF] [PDF Plus]
280. J. Caplin, A. Ray, S.M. Joshi. 2001. Damage-mitigating control of aircraft for enhanced structural durability. *IEEE Transactions on Aerospace and Electronic Systems* **37**:3, 849-862. [Crossref]
281. Ioan Jadic, Tom Hermann, Dayton Hartley, Jagannath Giri. Generalized aerodynamic forces based on CFD and correction factor techniques for AGARD wing 445.6 . [Citation] [PDF] [PDF Plus]
282. Michael Johnson, Charles Denegri, Jr.. Comparison of static and dynamic artificial neural networks for limit cycle oscillation prediction . [Citation] [PDF] [PDF Plus]
283. P.P. Friedmann, M. de Terlizzi, T.F. Myrtle. 2001. New developments in vibration reduction with actively controlled trailing edge flaps. *Mathematical and Computer Modelling* **33**:10-11, 1055-1083. [Crossref]
284. F. Nitzsche, S. Liberatore, D. G. Zimcik. 2001. Theoretical and experimental investigations on an active control system for vertical fin buffeting alleviation using strain actuation. *The Aeronautical Journal* **105**:1047, 277-285. [Crossref]
285. Peter M. Hartwich, Steven K. Dobbs, Alan E. Arslan, Suk C. Kim. 2001. Navier-Stokes Computations of Limit-Cycle Oscillations for a B-1-Like Configuration. *Journal of Aircraft* **38**:2, 239-247. [Citation] [PDF] [PDF Plus]
286. Rudy Yurkovich, D. Liu, P. Chen. State-of-the-art of unsteady aerodynamics for high performance aircraft . [Citation] [PDF] [PDF Plus]
287. P. P. Friedmann, E. Presente. 2001. Active Control of Flutter in Compressible Flow and Its Aeroelastic Scaling. *Journal of Guidance, Control, and Dynamics* **24**:1, 167-175. [Citation] [PDF] [PDF Plus]
288. . Fixed and Flapping Wing Aerodynamics for Micro Air Vehicle Applications . [Abstract] [PDF] [PDF Plus]
289. . A Rational Engineering Analysis of the Efficiency of Flapping Flight 249-274. [Citation] [PDF] [PDF Plus]
290. Robert Kroyer. On some aspects of fluid-structure interaction analysis with respect to aeroelasticity on industrial applications 1272-1277. [Crossref]
291. Daniella E. Raveh, Yuval Levy, Moti Karpel. 2000. Structural Optimization Using Computational Aerodynamics. *AIAA Journal* **38**:10, 1974-1982. [Citation] [PDF] [PDF Plus]
292. P. C. Chen. 2000. Damping Perturbation Method for Flutter Solution: The g-Method. *AIAA Journal* **38**:9, 1519-1524. [Citation] [PDF] [PDF Plus]
293. B. A. Winther, P. J. Goggin, J. R. Dykman. 2000. Reduced-Order Dynamic Aeroelastic Model Development and Integration with Nonlinear Simulation. *Journal of Aircraft* **37**:5, 833-839. [Citation] [PDF] [PDF Plus]
294. Jakob Kuttenkeuler. 2000. Optical Measurements of Flutter Mode Shapes. *Journal of Aircraft* **37**:5, 846-849. [Citation] [PDF] [PDF Plus]
295. Charles M. Denegri Jr.. 2000. Limit Cycle Oscillation Flight Test Results of a Fighter with External Stores. *Journal of Aircraft* **37**:5, 761-769. [Citation] [PDF] [PDF Plus]
296. Dale Pitt. A Complex Velocity solution of the flutter equations . [Citation] [PDF] [PDF Plus]
297. Peretz Friedmann. Aeroelastic scaling for fixed and rotary-wing aircraft with applications . [Citation] [PDF] [PDF Plus]
298. Mayuresh Patil, Dewey Hodges. On the importance of aerodynamic and structural geometrical nonlinearities in aeroelastic behavior of high-aspect-ratio wings . [Citation] [PDF] [PDF Plus]
299. Ioan Jadic, Dayton Hartley, Jagannath Giri. Improving the aerodynamic approximation in linear aeroelasticity . [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

300. Charles Denegri, Jr.. Limit cycle oscillation flight test results of a fighter with external stores . [Citation] [PDF] [PDF Plus]
301. Michael Johnson, Charles Denegri, Jr.. Statistical data evaluation for limit cycle oscillation prediction using artificial neural networks . [Citation] [PDF] [PDF Plus]
302. J. Brink-Spalink, J. Bruns. Correction of unsteady aerodynamic influence coefficients using experimental or CFD data . [Citation] [PDF] [PDF Plus]
303. Hubert Flomenhoft. Aeroelasticity and dynamic loads - From 1903 to the supersonic era . [Citation] [PDF] [PDF Plus]
304. D. E. Raveh, M. Karpel, S. Yaniv. 2000. Nonlinear Design Loads for Maneuvering Elastic Aircraft. *Journal of Aircraft* **37**:2, 313-318. [Citation] [PDF] [PDF Plus]
305. L. Balis Crema, F. Mastroddi, G. Coppotelli. 2000. Aeroelastic Sensitivity Analyses for Flutter Speed and Gust Response. *Journal of Aircraft* **37**:1, 172-180. [Citation] [PDF] [PDF Plus]
306. Daniella E. Raveh, Mordechay Karpel. 1999. Structural Optimization of Flight Vehicles with Computational-Fluid-Dynamics-Based Maneuver Loads. *Journal of Aircraft* **36**:6, 1007-1015. [Citation] [PDF] [PDF Plus]
307. Gertjan Looye. Integrated flight mechanics and aeroelastic aircraft modeling using object-oriented modeling techniques . [Citation] [PDF] [PDF Plus]
308. William P. Rodden, Paul F. Taylor, Samuel C. McIntosh Jr., Myles L. Baker. 1999. Further Convergence Studies of the Enhanced Doublet-Lattice Method. *Journal of Aircraft* **36**:4, 682-688. [Citation] [PDF] [PDF Plus]
309. Louw H. van Zyl. 1999. Application of the Subsonic Doublet Lattice Method to Delta Wings. *Journal of Aircraft* **36**:3, 609-611. [Citation] [PDF] [PDF Plus]
310. G. Barakos, D. Drikakis, W. Lefebre. 1999. Improvement to Numerical Predictions of Aerodynamic Flows Using Experimental Data Assimilation. *Journal of Aircraft* **36**:3, 611-614. [Citation] [PDF] [PDF Plus]
311. Myles Baker, Raul Mendoza, Peter Hartwich. Transonic aeroelastic analysis of a high speed transport wind tunnel model . [Citation] [PDF] [PDF Plus]
312. Marino d, Peretz Friedmann. BVI alleviation using active control . [Citation] [PDF] [PDF Plus]
313. Dale Pitt. A new non-iterative P-K match point flutter solution . [Citation] [PDF] [PDF Plus]
314. R. D'Vari, M. Baker. 1999. Aeroelastic Loads and Sensitivity Analysis for Structural Loads Optimization. *Journal of Aircraft* **36**:1, 156-166. [Citation] [PDF] [PDF Plus]
315. Thomas A. Zeiler, David McGhee, Joseph A. Brunty. 1999. Preliminary Static Aeroelastic Analysis of Reusable Launch Vehicle Stability and Control Derivatives. *Journal of Spacecraft and Rockets* **36**:1, 67-74. [Citation] [PDF] [PDF Plus]
316. . Structural Dynamics In Aeronautical Engineering . [Abstract] [PDF] [PDF Plus]
317. . Aeroelasticity Of Flight Vehicles 189-228. [Citation] [PDF] [PDF Plus]
318. Louw H. van Zyl. 1998. Arbitrary Accuracy Integration Scheme for the Subsonic Doublet Lattice Method. *Journal of Aircraft* **35**:6, 975-977. [Citation] [PDF] [PDF Plus]
319. Louw H. van Zyl. 1998. Convergence of the Subsonic Doublet Lattice Method. *Journal of Aircraft* **35**:6, 977-979. [Citation] [PDF] [PDF Plus]
320. Lars E. Ericsson. 1998. Rapid Prediction of Wing Rock for Slender Delta-Wing Configurations. *Journal of Aircraft* **35**:6, 979-981. [Citation] [PDF] [PDF Plus]
321. Tetsuhiko Ueda. 1998. Continuity of Lifting Surface Theory in Subsonic and Supersonic Flow. *AIAA Journal* **36**:10, 1788-1791. [Citation] [PDF] [PDF Plus]
322. H. Eschenauer, A. Schumacher, H. Hoenlinger, F. Kiessling. Multidisciplinary optimization strategy - Tool for an efficient design process of large-scale aircraft . [Citation] [PDF] [PDF Plus]
323. Daniella Raveh, Mordechay Karpel. Structural optimization of flight vehicles with non-linear aerodynamic loads . [Citation] [PDF] [PDF Plus]
324. William P. Rodden, Paul F. Taylor, Samuel C. McIntosh Jr.. 1998. Further Refinement of the Subsonic Doublet-Lattice Method. *Journal of Aircraft* **35**:5, 720-727. [Citation] [PDF] [PDF Plus]
325. Ashish Tewari. Robust optimal controllers for active flutter suppression . [Citation] [PDF] [PDF Plus]
326. Jakob Kuttenkeuler, Ulf Ringertz. 1998. Aeroelastic Design Optimization with Experimental Verification. *Journal of Aircraft* **35**:3, 505-507. [Citation] [PDF] [PDF Plus]
327. B. Winther, P. Goggin, J. Dykman. Reduced order dynamic aeroelastic model development and integration with nonlinear simulation . [Citation] [PDF] [PDF Plus]
328. E. Presente, P. Friedmann. Aeroservoelasticity in compressible flow and its scaling laws . [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

329. Per Back, Ulf Ringertz. 1997. Convergence of Methods for Nonlinear Eigenvalue Problems. *AIAA Journal* **35**:6, 1084-1087. [Citation] [PDF] [PDF Plus]
330. Kenneth B. Lazarus, Edward F. Crawley, Charrissa Y. Lin. 1997. Multivariable Active Lifting Surface Control Using Strain Actuation: Analytical and Experimental Results. *Journal of Aircraft* **34**:3, 313-321. [Citation] [PDF] [PDF Plus]
331. Hugo Resende, Nelson Nakagawa, Mauro Kamiyama, Hugo Resende, Nelson Nakagawa, Mauro Kamiyama. Control surface effects on tail flutter . [Citation] [PDF] [PDF Plus]
332. E. Presente, P. Friedmann, E. Presente, P. Friedmann. Aeroservoelasticity in subsonic flow and associated scaling laws . [Citation] [PDF] [PDF Plus]
333. Timothy Myrtle, Peretz Friedmann, Timothy Myrtle, Peretz Friedmann. Unsteady compressible aerodynamics of a flapped airfoil with application to helicopter vibration reduction . [Citation] [PDF] [PDF Plus]
334. Ashish Tewari, Ashish Tewari. Aeroservoelastic design for flutter suppression . [Citation] [PDF] [PDF Plus]
335. Changho Nam, Youdan Kim, Jeffrey Layton, Changho Nam, Youdan Kim, Jeffrey Layton. Active aeroelastic wing design for gust load alleviation and flutter suppression . [Citation] [PDF] [PDF Plus]
336. Donald B. Bliss, Ronald J. Epstein. 1996. Novel approach to aerodynamic analysis using analytical/numerical matching. *AIAA Journal* **34**:11, 2225-2232. [Citation] [PDF] [PDF Plus]
337. Mordechay Karpel, Edward Strul. 1996. Minimum-state unsteady aerodynamic approximations with flexible constraints. *Journal of Aircraft* **33**:6, 1190-1196. [Citation] [PDF] [PDF Plus]
338. Changho Nam, Youdan Kim, Keun-Myung Lee. Optimal wing design for flutter suppression with PZT actuators including power requirement . [Citation] [PDF] [PDF Plus]
339. Ashish Tewari. Aeroservoelastic design and analysis by nonlinear optimization . [Citation] [PDF] [PDF Plus]
340. Jong -Sun Kim, Changho Nam. 1996. H∞ control for flutter suppression of a laminated plate with self-sensing actuators. *KSME Journal* **10**:2, 169-179. [Crossref]
341. E. Goforth. Flutter analysis of the Linear Aerospike SR-71 Experiment (LASRE) . [Citation] [PDF] [PDF Plus]
342. C. Farhat, M. Lesoinne. On the accuracy, stability, and performance of the solution of three-dimensional nonlinear transient aeroelastic problems by partitioned procedures . [Citation] [PDF] [PDF Plus]
343. Thomas W. Strganac, Young Ik Kim. 1996. Aeroelastic behavior of composite plates subject to damage growth. *Journal of Aircraft* **33**:1, 68-73. [Citation] [PDF] [PDF Plus]
344. Li Ling, M. Damodaran, Robert K.L. Gay. 1996. A model for animating the motion of cloth. *Computers & Graphics* **20**:1, 137-156. [Crossref]
345. Ronald J. Epstein, Donald B. Bliss. 1995. Alternative solution of the kernel function in subsonic unsteady lifting surface theory. *AIAA Journal* **33**:11, 2228-2230. [Citation] [PDF] [PDF Plus]
346. R. S. Srivastava. 1995. Starting point of curvature for reflected diffracted shock wave. *AIAA Journal* **33**:11, 2230-2231. [Citation] [PDF] [PDF Plus]
347. Changho Nam, Youdan Kim. 1995. Optimal design of composite lifting surface for flutter suppression with piezoelectric actuators. *AIAA Journal* **33**:10, 1897-1904. [Citation] [PDF] [PDF Plus]
348. M. S. Eldred, V. B. Venkayya, W. J. Anderson. 1995. New mode tracking methods in aeroelastic analysis. *AIAA Journal* **33**:7, 1292-1299. [Citation] [PDF] [PDF Plus]
349. Mordechay Karpel, Eyal Presente. 1995. Structural dynamic loads in response to impulsive excitation. *Journal of Aircraft* **32**:4, 853-861. [Citation] [PDF] [PDF Plus]
350. In Lee, Seung-Ho Kim. 1995. Aeroelastic analysis of a flexible control surface with structural nonlinearity. *Journal of Aircraft* **32**:4, 868-874. [Citation] [PDF] [PDF Plus]
351. Donald Bliss, Ronald Epstein. A novel approach to aerodynamic analysis using Analytical /Numerical Matching . [Citation] [PDF] [PDF Plus]
352. E. Sulaeman, H. Djojodihardjo. An Expansion Series for Solving Improper Cylindrical Functions Occurring in Subsonic, Supersonic and Transonic Kernel Formulations 670-685. [Crossref]
353. Edward F. Crawley, Howard C. Curtiss, David A. Peters, Robert H. Scanlan, Fernando Sisto. Nonsteady aerodynamics of lifting and non-lifting surfaces 167-274. [Crossref]
354. Li Ling, Murali Damodaran, Robert Kheng Leng Gay. Physical Modelling for Animating Cloth Motion 461-474. [Crossref]
355. Ashith Tewari. 1994. Doubled-point method for supersonic unsteady aerodynamics of nonplanar lifting surfaces. *Journal of Aircraft* **31**:4, 745-752. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

356. H. Triebstein, G. Schewe, H. Zingel, S. Vogel. 1994. Measurement of unsteady airloads on an oscillating engine and a wing/engine combination. *Journal of Aircraft* **31**:1, 97-102. [Citation] [PDF] [PDF Plus]

357. Ashish Tewari. 1993. Accuracy of rational-function approximations for linear transonic unsteady aerodynamics. *Journal of Aircraft* **30**:6, 1001-1003. [Citation] [PDF] [PDF Plus]

358. John P. Crimaldi, Robert T. Britt, William P. Rodden. 1993. Response of B-2 aircraft to nonuniform spanwise turbulence. *Journal of Aircraft* **30**:5, 652-659. [Citation] [PDF] [PDF Plus]

359. Jinsoo Cho, Marc H. Williams. 1993. S-plane aerodynamics of nonplanar lifting surfaces. *Journal of Aircraft* **30**:4, 433-438. [Citation] [PDF] [PDF Plus]

360. . A Static and Dynamic Aeroelastic Loads and Sensitivity Analysis For Structural Loads optimization and Its Application to Transport Aircraft . [Citation] [PDF] [PDF Plus]

361. K.-Y. Fung, T. H. Shieh. 1993. Modeling, analysis, and prediction of flutter at transonic speeds. *AIAA Journal* **31**:1, 140-147. [Citation] [PDF] [PDF Plus]

362. Pengfei Liu, N. Bose. 1993. Propulsive performance of three naturally occurring oscillating propeller planforms. *Ocean Engineering* **20**:1, 57-75. [Crossref]

363. Paulo A. O. Soviero, Marcos Vinicius Bortolus. 1992. Generalized Vortex Lattice Surfaces in Method for Oscillating Lifting Subsonic Flow. *AIAA Journal* **30**:11, 2723-2729. [Citation] [PDF] [PDF Plus]

364. JONG-HO WOO. Static aeroelastic analysis of a maneuvering aircraft with damaged wing . [Citation] [PDF] [PDF Plus]

365. GREGORY SIKES, GEORGE TZONG, ANIL SHARMA. Flutter optimization of large transport aircraft . [Citation] [PDF] [PDF Plus]

366. K. Isogai. 1992. Transonic flutter/divergence characteristics of aeroelastically tailored and non-tailored high-aspect-ratio forward-swept wings. *Journal of Fluids and Structures* **6**:5, 525-537. [Crossref]

367. JONATHAN BOHLMANN, MICHAEL LOVE, DANIEL BARKER, WILLIAM ROGERS, BETH PAUL. Application of analytical and design tools for fighter wing aeroelastic tailoring . [Citation] [PDF] [PDF Plus]

368. T. TZONG, G. SIKES, M. LOIKKANEN. Multidisciplinary design optimization of a large transport aircraft wing . [Citation] [PDF] [PDF Plus]

369. Mordechay Karpel. Size-Reduction Techniques for the Determination of Efficient Aeroservoelastic Models 263-295. [Crossref]

370. Maher N. Bismarck-Nasr. 1991. Kernel function occurring in supersonic unsteady potential flow. *AIAA Journal* **29**:11, 2006-2007. [Citation] [PDF] [PDF Plus]

371. Mordechay Karpel. 1991. Extensions to the minimum-state aeroelastic modeling method. *AIAA Journal* **29**:11, 2007-2009. [Citation] [PDF] [PDF Plus]

372. W. Eversman, A. Tewari. 1991. Consistent rational-function approximation for unsteady aerodynamics. *Journal of Aircraft* **28**:9, 545-552. [Citation] [PDF] [PDF Plus]

373. Shih-I Pai, Shijun Luo. Linearized Theory of Three-Dimensional Potential Flow 345-394. [Crossref]

374. M. Karpel. 1990. Reduced-order aeroelastic models via dynamic residualization. *Journal of Aircraft* **27**:5, 449-455. [Citation] [PDF] [PDF Plus]

375. W. EVERSMAN. A reduced cost rational-function approximation for unsteady aerodynamics . [Citation] [PDF] [PDF Plus]

376. MORDECHAY KARPEL. Reduced size first-order subsonic and supersonic aeroelastic modeling . [Citation] [PDF] [PDF Plus]

377. Koji Isogai. 1989. Direct search method to aeroelastic tailoring of a composite wing under multiple constraints. *Journal of Aircraft* **26**:12, 1076-1080. [Citation] [PDF] [PDF Plus]

378. Kari Appa, Michael J. C. Smith. 1989. Evaluation of the constant pressure panel method for supersonic unsteady airloads prediction. *Journal of Aircraft* **26**:9, 854-862. [Citation] [PDF] [PDF Plus]

379. Kuo-Juin Lin, Pong-Jeu Lu, Jiann-Quo Tarn. 1989. Flutter analysis of cantilever composite plates in subsonic flow. *AIAA Journal* **27**:8, 1102-1109. [Citation] [PDF] [PDF Plus]

380. WALTER EVERSMAN, DALE PITT. A hybrid Doublet Lattice-Doublet Point Method for general lifting surface configurations in subsonic flow . [Citation] [PDF] [PDF Plus]

381. KARI APPA, MICHAEL SMITH. Evaluation of the constant pressure panel method (CPM) for unsteady air loads prediction . [Citation] [PDF] [PDF Plus]

382. William P. Rodden. 1988. Comment on 'The role of structural and aerodynamic damping on the aeroelastic behavior of wings'. *Journal of Aircraft* **25**:3, 286-288. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

383. . Gust Loads on Aircraft: Concepts and Applications . [Abstract] [PDF] [PDF Plus]

384. . Annotated Bibliography 287-296. [Citation] [PDF] [PDF Plus]

385. . References 297-302. [Citation] [PDF] [PDF Plus]

386. Earl H. Dowell, Marat Ilgamov. Unsteady Transonic Aerodynamics and Aeroelasticity 206-284. [Crossref]

387. AndréPreumont. 1988. RANDOM: A program for the stationary random vibration analysis of linear structures with hereditary characteristics. *Advances in Engineering Software (1978)* **10**:1, 32-39. [Crossref]

388. Lyle N. Long, George A. Watts. 1987. Arbitrary motion aerodynamics using an aeroacoustic approach. *AIAA Journal* **25**:11, 1442-1448. [Citation] [PDF] [PDF Plus]

389. I. Lottati, E. Nissim. 1987. Nonplanar, supersonic, three-dimensional, oscillatory, piecewise continuous-kernel function method. *Journal of Aircraft* **24**:1, 45-54. [Citation] [PDF] [PDF Plus]

390. F. FARASSAT, M. MYERS. Aerodynamics via acoustics - Application of acoustic formulas for aerodynamic calculations . [Citation] [PDF] [PDF Plus]

391. M. WILLIAMS, C.-C. HWANG. Three dimensional unsteady aerodynamics and aeroelastic response of advanced turboprops . [Citation] [PDF] [PDF Plus]

392. Anthony S. Pototzky, Boyd Perry III. 1986. New and existing techniques for dynamic loads analyses of flexible airplanes. *Journal of Aircraft* **23**:4, 340-347. [Citation] [PDF] [PDF Plus]

393. Earl H. Dowell. Unsteady Transonic Aerodynamics and Aeroelasticity 39-98. [Crossref]

394. A. Ichikawa. 1985. Doublet strip method for oscillating swept tapered wings in incompressible flow. *Journal of Aircraft* **22**:11, 1008-1012. [Citation] [PDF] [PDF Plus]

395. M. H. L. Hounjet. 1985. A field panel/finite difference method for potential unsteady transonic flow. *AIAA Journal* **23**:4, 537-545. [Citation] [PDF] [PDF Plus]

396. V.S. Holla, K.P. Rao, C.B. Asthana, A. Arokkiaswamy. 1984. Aerodynamic characteristics of pretensioned elastic membrane rectangular sailwings. *Computer Methods in Applied Mechanics and Engineering* **44**:1, 1-16. [Crossref]

397. Tetsuhiko Ueda, Earl H. Dowell. 1984. Reply by Authors to W. P. Rodden. *AIAA Journal* **22**:4, 575-576. [Citation] [PDF] [PDF Plus]

398. T. Ueda, E. H. Dowell. 1984. Doublet-Point Method for Supersonic Unsteady Lifting Surfaces. *AIAA Journal* **22**:2, 179-186. [Citation] [PDF] [PDF Plus]

399. William P. Rodden. 1984. Comment on 'A new solution method for lifting surfaces in subsonic flow'. *AIAA Journal* **22**:1, 160-160. [Citation] [PDF] [PDF Plus]

400. M. Hashimoto, S. Suzuki, K. Nakamura. 1984. Application of the finite element technique to aerodynamic problems of aircraft. *Computers & Structures* **19**:1-2, 57-69. [Crossref]

401. E. Nissim, I. Lottati. 1983. Supersonic three-dimensional oscillatory piecewise continuous kernelfunction method. *Journal of Aircraft* **20**:8, 674-681. [Citation] [PDF] [PDF Plus]

402. A. Ichikawa, S. Ando. 1983. Improved numerical method for unsteady lifting surfaces in incompressible flow. *Journal of Aircraft* **20**:7, 612-616. [Citation] [PDF] [PDF Plus]

403. M. MYERS, P. GURUSWAMY, P. GOORJIAN. Flutter analysis of a transport wing using XTRAN3S . [Citation] [PDF] [PDF Plus]

404. Yoshikazu Miyazawa, Kyuichiro Washizu. 1983. A finite state aerodynamic model for a lifting surface in incompressible flow. *AIAA Journal* **21**:2, 163-171. [Citation] [PDF] [PDF Plus]

405. Shigenori Ando, Akio Ichikawa. 1983. The use of an error index to improve numerical solutions for unsteady lifting airfoils. *AIAA Journal* **21**:1, 47-54. [Citation] [PDF] [PDF Plus]

406. C. J. Borland, D. P. Rizzetta. 1982. Nonlinear transonic flutter analysis. *AIAA Journal* **20**:11, 1606-1615. [Citation] [PDF] [PDF Plus]

407. T. UDEA, E. DOWELL. Flutter analysis using nonlinear aerodynamic forces . [Citation] [PDF] [PDF Plus]

408. C. D. Turner. 1982. Wing/control surface flutter analysis using experimentally correctedaerodynamics. *Journal of Aircraft* **19**:4, 342-344. [Citation] [PDF] [PDF Plus]

409. Mordechay Karpel. 1982. Design for Active Flutter Suppression and Gust Alleviation Using State-Space Aeroelastic Modeling. *Journal of Aircraft* **19**:3, 221-227. [Citation] [PDF] [PDF Plus]

410. T. Ueda, E. H. Dowell. 1982. A new solution method for lifting surfaces in subsonic flow. *AIAA Journal* **20**:3, 348-355. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

411. Brent A. Miller, James H. Dittmar, Robert J. Jeracki. 1982. Propeller tip vortex - A possible contributor to aircraft cabin noise. *Journal of Aircraft* **19**:1, 84-86. [Citation] [PDF] [PDF Plus]

412. S. R. Anthony, M. R. Myers. 1982. New Frequency Parameter for Unsteady Aerodynamics. *Journal of Aircraft* **19**:1, 82-84. [Citation] [PDF] [PDF Plus]

413. H.K. Cheng. Computational Study of the Asymptotic Flow Structure of a High-Aspect-Ratio Swept Wing in Transonic Flow 107-145. [Crossref]

414. Koji Isogai. 1981. Transonic dip mechanism of flutter of a sweptback wing. II. *AIAA Journal* **19**:9, 1240-1242. [Citation] [PDF] [PDF Plus]

415. A. Aziz, T. Y. Na. 1981. New approach to the solution of Falkner-Skan equation. *AIAA Journal* **19**:9, 1242-1244. [Citation] [PDF] [PDF Plus]

416. J.K. Mahesh, C.R. Stone, W.L. Garrard, H.J. Dunns. 1981. Control Law Synthesis for Flutter Suppression Using Linear Quadratic Gaussian Theory. *Journal of Guidance and Control* **4**:4, 415-422. [Citation] [PDF]

417. B. Etkin. 1981. Turbulent Wind and Its Effect on Flight. *Journal of Aircraft* **18**:5, 327-345. [Citation] [PDF] [PDF Plus]

418. S. ANTHONY, M. MYERS. A new frequency parameter for unsteady aerodynamics . [Citation] [PDF] [PDF Plus]

419. F. E. Eastep, J. J. Olsen. 1980. Transonic Flutter Analysis of a Rectangular Wing with Conventional Airfoil Sections. *AIAA Journal* **18**:10, 1159-1164. [Citation] [PDF] [PDF Plus]

420. V. MUKHOPADHYAY, J. NEWSOM, I. ABEL. A direct method for synthesizing low-order optimal feedback control laws with application to flutter suppression . [Citation] [PDF] [PDF Plus]

421. D.S.Simha Prasad, V.S. Holla. 1980. Doublet lattice method — schemes for CPU time reduction. *Computer Methods in Applied Mechanics and Engineering* **23**:1, 59-65. [Crossref]

422. Jerry R. Newsom. 1979. Control Law Synthesis for Active Flutter Suppression Using Optimal Control Theory. *Journal of Guidance and Control* **2**:5, 388-394. [Citation] [PDF]

423. Koji Isogai. 1979. On the Transonic-Dip Mechanism of Flutter of a Sweptback Wing. *AIAA Journal* **17**:7, 793-795. [Citation] [PDF] [PDF Plus]

424. H. D. Nelson, D. A. Glasgow. 1979. Eigenrelations for General Second-Order Systems. *AIAA Journal* **17**:7, 795-797. [Citation] [PDF] [PDF Plus]

425. F. HEMMIG, V. VENKAYYA, F. EASTEP. Flutter speed degradation of damaged, optimized flight vehicles . [Citation] [PDF] [PDF Plus]

426. William P. Rodden. 1979. Rebuttal to Reply by Author to "Comment on 'Flutter of Flat Finite Element Panels in a Supersonic Potential Flow' ". *AIAA Journal* **17**:4, 446-448. [Citation] [PDF] [PDF Plus]

427. M. MENDENHALL, S. SPANGLER, S. PERKINS, JR.. Vortex shedding from circular and noncircular bodies at high angles of attack . [Citation] [PDF] [PDF Plus]

428. P. SOOHOO, R. NOLL, L. MORINO, N. HAM. Green's function method for the computational aerodynamic analysis of complex helicopter configurations . [Citation] [PDF] [PDF Plus]

429. H.W. Försching. 1979. Prediction of the unsteady airloads on oscillating lifting systems and bodies for aeroelastic analyses. *Progress in Aerospace Sciences* **18**, 211-269. [Crossref]

430. W. Geissler. 1978. Nonlinear Unsteady Potential Flow Calculations for Three-Dimensional Oscillating Wings. *AIAA Journal* **16**:11, 1168-1174. [Citation] [PDF] [PDF Plus]

431. A. K. Wiersma. 1978. On the profit of optimizing the fin-keel of a yacht sailing close to wind. *Journal of Engineering Mathematics* **12**:4, 357-364. [Crossref]

432. Irving Abel, Boyd Perry III, Harold N. Murrowf. 1978. Two Synthesis Techniques Applied to Flutter Suppression on a Flight Research Wing. *Journal of Guidance and Control* **1**:5, 340-346. [Citation] [PDF]

433. William P. Rodden. 1978. Comment on "Effect of Stabilizer Dihedral and Static Lift on T-Tail Flutter". *Journal of Aircraft* **15**:7, 447-448. [Citation] [PDF] [PDF Plus]

434. Samuel C. McIntosh, Holt Ashley. 1978. On the optimization of discrete structures with aeroelastic constraints. *Computers & Structures* **8**:3-4, 411-419. [Crossref]

435. Valter J. E. Stark, Dale E. Cooley. 1977. Comparative flutter calculations for the Viggen aircraft. *Journal of Aircraft* **14**:9, 920-921. [Citation] [PDF] [PDF Plus]

436. Valter J. E. Stark. 1977. Leading-edge vortex effect on the flutter speed. *Journal of Aircraft* **14**:9, 921-922. [Citation] [PDF] [PDF Plus]

437. E. Nissim, L. Lottati. 1977. Oscillatory Subsonic Piecewise Continuous Kernel Function Method. *Journal of Aircraft* **14**:6, 515-516. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

438. R. DOGGETT, JR., R. RICKETTS. Some experimental and theoretical flutter characteristics of an arrow-wing configuration . [Citation] [PDF] [PDF Plus]
439. T. H. Burkhart. 1977. Subsonic Transient Lifting Surface Aerodynamics. *Journal of Aircraft* **14**:1, 44-50. [Citation] [PDF] [PDF Plus]
440. Terrence A. Weisshaar, J.B. Crittenden. 1976. Flutter of Asymmetrically Swept Wings. *AIAA Journal* **14**:8, 993-994. [Citation] [PDF] [PDF Plus]
441. K. TSENG, L. MORINO. A new unified approach for analyzing wing-body-tail configurations with control surfaces . [Citation] [PDF] [PDF Plus]
442. PAULO RIZZI. OPTIMIZATION OF MULTI-CONSTRAINED STRUCTURES BASED ON OPTIMALITY CRITERIA? . [Citation] [PDF] [PDF Plus]
443. KADIN TSENG, LUIGI MERINO. FULLY UNSTEADY SUBSONIC AND SUPERSONIC POTENTIAL AERODYNAMICS OF COMPLEX AIRCRAFT CONFIGURATIONS FOR FLUTTER APPLICATIONS . [Citation] [PDF] [PDF Plus]
444. R. VEPA. On the use of Pade approximants to represent unsteady aerodynamic loads for arbitrarily small motions of wings . [Citation] [PDF] [PDF Plus]
445. T. BURKHART. Subsonic transient lifting surface aerodynamics . [Citation] [PDF] [PDF Plus]
446. S. SEGENREICH, S. MCINTOSH, JR.. Weight minimization of structures for fixed flutter speed via an optimality criterion . [Citation] [PDF] [PDF Plus]
447. LUIGI MORINO, LEE-TZONG CHEN, EMIL O. SUCIU. 1975. Steady and Oscillatory Subsonic and Supersonic Aerodynamics around Complex Configurations. *AIAA Journal* **13**:3, 368-374. [Citation] [PDF] [PDF Plus]
448. Maynard C. Sandford, Irving Abel, David L. Gray. 1975. Transonic Study of Active Flutter Suppression Based on an Energy Concept. *Journal of Aircraft* **12**:2, 72-77. [Citation] [PDF] [PDF Plus]
449. James F. Unruh, Robert L. Bass III. 1974. Doublet lattice-source method for calculating unsteady loads on cavitating hydrofoils. *Journal of Hydronautics* **8**:4, 146-153. [Citation] [PDF] [PDF Plus]
450. W. P. Rodden. 1974. Dihedral effect of a flexible wing. *Journal of Aircraft* **11**:6, 367-368. [Citation] [PDF] [PDF Plus]
451. William P. Rodden, Joseph P. Giesing, Terez P. Kalman, Jack C. Rowan. 1974. Comment on "A Finite-Element Method for Calculating Aerodynamic Coefficients of a Subsonic Airplane". *Journal of Aircraft* **11**:6, 366-367. [Citation] [PDF] [PDF Plus]
452. LUIGI MORINO, CHING-CHIANG KUO. 1974. Subsonic Potential Aerodynamics for Complex Configurations : A General Theory. *AIAA Journal* **12**:2, 191-197. [Citation] [PDF] [PDF Plus]
453. KOJI ISOGAI. 1974. Lifting-Surface Theory for an Oscillating T-Tail. *AIAA Journal* **12**:1, 28-37. [Citation] [PDF] [PDF Plus]
454. Hans Wilhelm Försching. Aerodynamische Grundlagen 149-373. [Crossref]
455. L.B. GWIN, R.F. TAYLOR. 1973. A General Method for Flutter Optimization. *AIAA Journal* **11**:12, 1613-1617. [Citation] [PDF] [PDF Plus]
456. JOHN KENNETH HAVILAND. 1973. Integral Equation for Small Perturbations of Irrotational Flows. *AIAA Journal* **11**:12, 1778-1780. [Citation] [PDF] [PDF Plus]
457. L. P. FELTON, R. B. NELSON, A. J. BRONOWICKI. 1973. Thin-Walled Elements in Truss Synthesis. *AIAA Journal* **11**:12, 1780-1782. [Citation] [PDF] [PDF Plus]
458. Richard R. Chipman, Frank J. Rauch, Robert W. Hess. 1973. Flutter of Pairs of Aerodynamically Interfering Delta Wings. *Journal of Aircraft* **10**:12, 728-734. [Citation] [PDF] [PDF Plus]
459. W. P. JONES, JIMMIE A. MOORE. 1973. Simplified aerodynamic theory of oscillating thin surfaces in subsonic flow. *AIAA Journal* **11**:9, 1305-1309. [Citation] [PDF] [PDF Plus]
460. Warren A. Stauffer, John G. Lewolt, Frederic M. Hoblit. 1973. Application of Advanced Methods to Design Loads Determination for the L-1011 Transport. *Journal of Aircraft* **10**:8, 449-458. [Citation] [PDF] [PDF Plus]
461. KOJI ISOGAI, TERUO ICHIKAWA. 1973. Lifting-surface theory for a wing oscillating in yaw and sideslip with an angle of attack. *AIAA Journal* **11**:5, 599-606. [Citation] [PDF] [PDF Plus]
462. JOHN KENNETH HAVILAND, YOUNG SIK YOO. 1973. Downwash-velocity potential method for oscillating surfaces. *AIAA Journal* **11**:5, 607-612. [Citation] [PDF] [PDF Plus]
463. J. P. GIESING, T. P. KALMAN, W. P. RODDEN. 1972. Subsonic Steady and Oscillatory Aerodynamics for Multiple Interfering Wings and Bodies. *Journal of Aircraft* **9**:10, 693-702. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086

464. ATLEE M. CUNNINGHAM JR.. 1972. Unsteady Subsonic Collocation Method for Wings with and without Control Surfaces. *Journal of Aircraft* **9**:6, 413-419. [Citation] [PDF] [PDF Plus]

465. Richard M. James. 1972. On the remarkable accuracy of the vortex lattice method. *Computer Methods in Applied Mechanics and Engineering* **1**:1, 59-79. [Crossref]

466. J. GIESING, T. KALMAN. Subsonic unsteady aerodynamics for general configurations . [Citation] [PDF] [PDF Plus]

467. V. STARK. A subsonic oscillating-surface theory for wings with partial-span controls . [Citation] [PDF] [PDF Plus]

468. W. P. RODDEN, J. P. GIESING, T. P. KALMAN. 1972. Refinement of the nonplanar aspects of the subsonic doublet-lattice lifting surface method. *Journal of Aircraft* **9**:1, 69-73. [Citation] [PDF] [PDF Plus]

469. W. J. MYKYTOW, T. E. NOLL, L. J. HUTTSELL, M. H. SHIRK. 1972. Investigations Concerning the Coupled Wing-Fuselage-Tail Flutter Phenomenon. *Journal of Aircraft* **9**:1, 48-54. [Citation] [PDF] [PDF Plus]

470. JOHN KENNETH HAVILAND. 1971. Downwash-velocity potential method for lifting surfaces. *AIAA Journal* **9**:11, 2268-2269. [Citation] [PDF] [PDF Plus]

471. HOLT ASHLEY. 1971. Some considerations relative to the prediction of unsteady air loadson lifting configurations. *Journal of Aircraft* **8**:10, 747-756. [Citation] [PDF] [PDF Plus]

472. ROBERT L. HARDER, WILLIAM P. RODDEN. 1971. Kernel function for nonplanar oscillating surfaces in supersonic flow. *Journal of Aircraft* **8**:8, 677-679. [Citation] [PDF] [PDF Plus]

473. T. P. KALMAN, W. P. RODDEN, J. P. GIESING. 1971. Application of the Doublet-Lattice Method to Nonplanar Configurations in Subsonic Flow. *Journal of Aircraft* **8**:6, 406-413. [Citation] [PDF] [PDF Plus]

474. L. HUTTSELL, W. MYKYTOW, T. NOLL, M. SHIRK. AFFDL investigations concerning the coupled wing-fuselage-tail flutter phenomenon . [Citation] [PDF] [PDF Plus]

475. ATLEE M. CUNNINGHAM JR.. 1971. An efficient, steady, subsonic collocation method for solving lifting-surface problems. *Journal of Aircraft* **8**:3, 168-176. [Citation] [PDF] [PDF Plus]

476. B. LASCHKA, O. SENSBURG. 1970. Flutter induced by aerodynamic interference between wing and tail. *Journal of Aircraft* **7**:4, 319-324. [Citation] [PDF] [PDF Plus]

477. JOSEPH P. GIESING, WILLIAM P. RODDEN, BERNHARD STAHL. 1970. Sears function and lifting surface theory for harmonic gust fields. *Journal of Aircraft* **7**:3, 252-255. [Citation] [PDF] [PDF Plus]

478. WILLIAM P. RODDEN, JOSEPH P. GIESING. 1970. Application of oscillatory aerodynamic theory to estimation of dynamic stability derivatives. *Journal of Aircraft* **7**:3, 272-275. [Citation] [PDF] [PDF Plus]

479. THEODORE J. GOLDBERG, JERRY N. HEFNER. 1970. Starting criterion for hypersonic inlets. *Journal of Aircraft* **7**:3, 275-277. [Citation] [PDF] [PDF Plus]

480. M. Hanel, K. H. Well. Controller Design for a Flexible Aircraft 155-180. [Crossref]

481. R. Voss. The Legacy of Camillo Possio to Unsteady Aerodynamics 1-14. [Crossref]

482. E. ALBANO, W. P. RODDEN. 1969. Errata: "Doublet-Lattice Method for Calculating Lift Distributions on Oscillating Surfaces in Subsonic Flows". *AIAA Journal* **7**:11, 2192a-2192a. [Citation] [PDF] [PDF Plus]

483. LEONARD W. SCHWARTZ. 1969. Erratum: "Comment on 'An Empirical Expression for Drag Coefficients of Cones at Supersonic Speeds' ". *AIAA Journal* **7**:11, 2192b-2192b. [Citation] [PDF] [PDF Plus]

Downloaded by I.S.A.E Inst Superieur de L'aero. Et on May 7, 2020 | http://arc.aiaa.org | DOI: 10.2514/3.5086