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Real-Time Unsteady Loads Measurements Using Hot-Film Sensors

By Timothy R. Moes

BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 24 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. Several flight-critical aerodynamic problems such as buffet, flutter, stall, and wing rock are strongly affected or caused by abrupt changes in unsteady aerodynamic loads and moments. Advanced sensing and flow diagnostic techniques have made possible simultaneous identification and tracking, in realtime, of the critical surface, viscosity-related aerodynamic phenomena under both steady and unsteady flight conditions. The wind tunnel study reported here correlates surface hot-film measurements of leading edge stagnation point and separation point, with unsteady aerodynamic loads on a NACA 0015 airfoil. Lift predicted from the correlation model matches lift obtained from pressure sensors for an airfoil undergoing harmonic pitchup and pitchdown motions. An analytical model was developed that demonstrates expected stall trends for pitchup and pitchdown motions. This report demonstrates an ability to obtain unsteady aerodynamic loads in real time, which could lead to advances in air vehicle safety, performance, ride-quality, control, and health management. This item ships from La Vergne, TN. Paperback.



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