Finite element vibration and dynamic response analysis of engineering structures

A bibliography (*1994–1998*)

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This bibliography lists references to papers, conference proceedings, and theses/dissertations dealing with finite element vibration and dynamic response analysis of engineering structures that were published from 1994 to 1998. It contains 539 citations. The following types of structures are included: basic structural systems; ground structures; ocean and coastal structures; mobile structures; and containment structures.

1. Introduction

Information is the most valuable, but least valued, tool the professional has. The output of scientific papers keeps growing, making it more difficult to be up-to-date with all the relevant information. The number of channels that researchers and practicing engineers have at their disposal for information retrieval is also increasing. In engineering, informal knowledge channels are the most frequently used means of obtaining information. Many professionals prefer to rely on personal judgment or on the wisdom of their colleagues whenever they have problems to solve. Hopefully, this bibliography will save time for readers.

Advanced numerical methods, for which finite element methods are the most efficient and most frequently used, are extremely important for complicated engineering structures such as spacecraft, airplanes, automobiles, buildings, bridges, dams, containment vessels, etc. By means of dynamic analyses and simulations one can determine whether a structure under consideration will fulfill its function, and the results of the dynamic loadings acting on this structure can be predicted. In this way, it can be determined which structural parameter most affects the dynamic response. Then, the structure can be modified and functionally improved. Both time response and frequency response calculations of a system may be performed. Additionally, nonlinear effects often have to be considered in the design/analysis of structures to improve their performances and to increase the operating range. Nonlinear finite element analysis can improve the design of such structures. It should be noted that the area of dynamic response analysis where the finite element method is implemented still requires significant research and development in two main directions: the development of more effective basic procedures, and the enhancement of the solution of large systems of equations.

This bibliography provides a list of references on finite element vibration and dynamic response analysis of engineering structures. General solution techniques as well as problem-specific applications are included. The entries have been retrieved from the author's database, MAKEBASE [1,2]. The references have been published in scientific journals, conference proceedings, theses and dissertations between 1994 and 1998. They are sorted in each category alphabetically according to the first author's name. If a specific paper is relevant for several subject categories, the same reference will be listed under all appropriate section headings; interested readers should also consider areas adjacent to their central area of research. Listed references are grouped into the following sections and subsections:

- basic structural systems
- ground structures (trusses/frames/buildings and walls; bridges; dams; piles, foundations and underground structures; pavements; and other structures)
- ocean and coastal structures
- mobile structures (aircraft, helicopters, and aerospace structures; automobiles; ships; railways and trains; and other structures)

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– containment structures (reactors and pressure vessels; pipes; storage tanks and other structures)

Not included in the bibliography are impact problems, crashworthiness, rotor dynamics, dynamic analysis of structural elements, dynamic analysis of machine elements, vibration control and aerodynamic problems.

Readers interested in finite element literature in general are referred to [3] or to the author's Internet Finite Element Books Bibliography (http://www.solid.ikp.liu.se/fe/index.html).

2. Basic structural systems

The topics in this section contain papers dealing with: free vibration analysis; computation of eigenfrequencies/natural frequencies; 2D and 3D linear and nonlinear dynamic response analysis; dynamic forced response; structural deterioration by dynamic response; modal analysis of structures with imprecise material properties; structures under cyclic or moving loads; damping characteristics; dynamic testing of structures; NDE of the dynamic response; adaptive methods; and stochastic analysis.

Materials under consideration include: metals; steel; concrete; steel-concrete; composites; laminated composites; reinforced/unreinforced masonry; and brickwork.

In this section the following structures and structural systems are handled: joined beams; plate assemblies; beam-plate assemblies; beam-column structures; loosely jointed structures; flexible systems; long flexible structures; panels; perforated panels; sandwich panels; honeycomb sandwich structures; arches; circular arches; shallow arches; arches with cracks; slabs; girders; lattice girders; post-tensioned girders; beam grillages; thin-walled structures; tubular structures; repetitive structures; lattice structures; tension structures; suspended structures; cable stayed structures; sliding cable systems; and antivibration mounts.

3. Ground structures

This section contains the following subsections: trusses/frames/buildings and walls; bridges; dams; piles, foundations and underground structures; pavements; and other structures. Topics included for all these subcategories are: 2D and 3D, linear and nonlinear dynamic response analysis; modal analysis; hybrid inverse eigenmode problems; vibration analysis; forced vibration response; vibration analysis of cracked structures; walking/traffic vibration problems; structures under random traffic excitations; natural frequency evaluation; vibration mode localization; parametric identification; dynamic analysis of structures with uncertainties; reliability analysis; multibody simulations; dynamic experimental testing; influence of damping in dynamic analysis; and parametric studies.

The types of structures discussed are listed for each subcategory separately, as indicated below.

Trusses/frames/buildings and walls

Trusses; lattice trusses; frames; portal frames; sandwich frames; reinforced concrete infilled frames; buildings; tall buildings; historical buildings; nuclear reactor buildings; reinforced concrete buildings; light frame wood buildings; building floors; shear walls; reinforced concrete shear walls; safety walls; reinforced earth walls; stiffened coupled shear walls; panel precast wall systems; coupled shear wall-frame systems; and structures on elastic foundation.

Bridges

Bridges; continuous bridges; multi-span/multi-cell bridges; multi-span continuous bridges; long-span bridges; reinforced concrete bridges; prestressed concrete bridges; composite cellular bridges; slender wood bridges; arch bridges; masonry arch bridges; girder bridges; slab-type bridges; through-truss bridges; box girder bridges; curved box girder bridges; cable-stayed bridges; long-span cable-stayed bridges; suspension bridges; suspension footbridges; composite footbridges; highway bridges; ship canal bridges; moored floating bridges; bridges with isolation bearings; bridge decks; bridge girder-diaphragm interaction; bridge-vehicle interaction; and repaired bridges.

Dams

Dams; earth dams; concrete gravity dams; arch dams; high arch dams; inflatable dams; embankment dams; and dam-reservoir- foundation systems.

Piles, foundations and underground structures

Piles; pile groups; pile foundations; large diameter pile foundations; rigid foundations; deep foundations; raft foundations; footings; tunnels; and subway structures.

Pavements

Pavements; rigid pavements; flexible pavement systems; concrete pavements; jointed concrete pavements;

composite pavements; road pavements; airport concrete pavements; pavement discontinuities; and pavements under moving loads.

Other structures

Guyed towers; elevator towers; reservoir towers; wind turbine towers; articulated towers; lattice towers; church bell towers; cooling towers; thin-walled towers; guyed masts; transmitter masts; transmission lines; thin-walled domes; thermowells; and athletic/sport flooring systems.

4. Ocean and coastal structures

This category of structures is not divided into subsections. Topics included here are: 2D and 3D, linear and nonlinear dynamic response analysis; hybrid dynamic analysis; modal analysis; modal parameter estimation; frequency domain analysis; hydrodynamic interactions of waves; mooring dynamics; reliability assessment; and parametric studies.

Types of ocean and coastal structures included in the papers are: floating structures; long floating structures; flexible floating structures; mat-like floating structures; jacket structures; flexible and rigid risers; tension leg platforms; spar platforms; offshore platforms; submarine pipelines; underwater cables; oilfield derrick structures; marine structures; caissons; refinery piers; breakwaters; and pontoon-type breakwaters.

5. Mobile structures

The following subsections are included for mobile structures: aircrafts, helicopters and aerospace structures; automobiles; ships; railways and trains; and other structures. Again, as in the Section 3, topics listed are common for all five subsections. They are: 2D and 3D, linear and nonlinear, dynamic response analysis; eigenvalue analysis; modal analysis; vibration analysis; thermally induced vibrations; low frequency vibrations; high frequency vibrations; vibration reduction; wave propagation problems; vehicle-track interaction; and parametric studies.

Types of structures discussed in the papers for each subcategory may include:

Aircraft, helicopters and aerospace structures

Aircraft and helicopters; wings; supersonic wings; aircraft landing system; aircraft brakes; airframe panels; exhaust nozzle; rotor-fuselage problems; elastomeric dampers; fuselage structures; high speed aircraft generators; hydraulic power systems; helicopter rotors; helicopter seats; helicopter skid gears; helicopter tail booms; deployable space structures; deployable satellite antennas; space shuttle main engine; space shuttle tiles; satellite booms; spacecrafts; aerospace structures; asymmetric rockets; and photovoltaic arrays.

Automobiles

Automobiles; carbodies; body-on-frame automobiles; chassis-suspensions; vehicle suspensions; engines; disc brakes; vehicle drivelines; transmission housing; exhaust pipes; rear-view mirrors; hydraulic engine mounts; vehicle vibration isolation; and energy absorbers.

Ships

Submersible hulls; double hull structures; sailing monohulls; cargoships; ship deckhouses; ship propulsion systems; and shafts.

Railways and trains

Railway tracks; lightweight rail track systems; railway passenger car body; synchronous motor driven trains; high-speed trains; and subway structures.

Other structures

Trucks; truck-trailer vehicles; mining trucks; tracked vehicles; armored vehicles; tractor protective cabs; tractor-trailers; hydraulic cranes; buses; mountain bikes; road bikes; tires; mobile antennas; engines; engine mounts; engine crankshafts; engine blocks; and gearboxes.

6. Containment structures

This last part contains the following subjects: reactors and pressure vessels; pipes; storage tanks and other structures. Topics relevant to all three subcategories are: 2D and 3D, linear and nonlinear, dynamic response analysis; vibration studies; flow-induced vibration analysis; vibration analysis in the frequency domain; vibration analysis in the time domain; modal analysis; coupled response analysis; forced vibration analysis; parametric studies.

Reactors and pressure vessels

Reactors; CANDU reactors; Tokamak support systems; fuel channels; protective covers; fusion reactor blankets; heat exchangers; steam condensers; thick cylinders; blast containment vessels; and pressure vessels.

Pipes

Pipes; curved pipes; pressurized elbows; deep ocean pipes; crust mining pipes; nuclear piping; piping systems; pipelines; multi-span pipes; fluid-conveying pipes; cantilever whipping pipes; and compressor-piping systems.

Storage tanks and other structures

Cylindrical water tanks; rectangular storage tanks; double-decker cylindrical tanks; base isolated liquid storage tanks; clamped-free storage tanks; fluid-filled membrane structures; oil storage tanks; waste storage tanks; and silos.

Acknowledgement

The bibliography presented is by no means complete but it gives a comprehensive representation of different finite element applications on the subjects covered. The author wishes to apologize for the unintentional exclusions of missing references and would appreciate receiving comments and pointers to other relevant literature for a future update.

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Ground structures

Trusses, frames, buildings and walls

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