

## **BEM FEM coupling for acoustic effects on aeroelastic stability of structures**

### **ABSTRACT**

A series of work has been carried out to develop the foundation for the computational scheme for the calculation of the influence of the acoustic disturbance to the aeroelastic stability of the structure. The generic approach consists of three parts. The first is the formulation of the acoustic wave propagation governed by the Helmholtz equation by using boundary element approach, which then allows the calculation of the acoustic pressure on the acoustic-structure boundaries. The structural dynamic problem is formulated using finite element approach. The third part involves the calculation of the unsteady aerodynamics loading on the structure using generic unsteady aerodynamics computational method. Analogous to the treatment of dynamic aeroelastic stability problem of structure, the effect of acoustic pressure disturbance to the aeroelastic structure is considered to consist of structural motion independent incident acoustic pressure and structural motion dependent acoustic pressure, referred to as the acoustic aerodynamic analogy. Results are presented and compared to those obtained in earlier work.

**Keyword:** Boundary element method; Finite element method; Fluid-structure coupling; Computational mechanics