Dynamic Analysis of Beam Problems Using the *hp*-Clouds Meshless FEM

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The *hp*-Clouds Method Finite Element Method is a set of procedures applicable to arbitrary domain and loading, and employs only a set of arbitrarily distributed nodes for the definition of the approximate solution to boundary-value problems, without the definition of a mesh of elements in the way used in the standard FEM. The method uses a set of radial basis functions of varying size of supports and with reproducing properties of polynomials of arbitrary order. Another numerical method is used in parallel, the Moving Least Square Method, to build test and basis functions. The *hp*-Clouds FEM have shown high rates of convergence and allows for *hp* enrichment more efficiently than the *hp* versions of the standard FEM.

One of the limitations of the standard versions of the FEM is the ability to deal with dynamic problems in the range of medium and high frequencies. In problems of acoustic-structure interaction, the FEM is satisfactory for frequencies below 500Hz. Above 2000Hz the Statistical Energy Analysis is efficient, but in the intermediate range 500Hz-2000Hz there is a lack of efficient numerical methods available. In this range of frequencies there are important classes of both industrial and environmental problems.

This paper investigates the use of the *hp*-Clouds method to model the response of beams under higher frequency excitations and results are presented and compared to analytical solutions.