Investigations on Timoshenko Beam Problems Using the *hp*-Clouds Meshless FEM

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The *hp*-Clouds Method is a new meshless Finite and Boundary Element Method. In spite of its great success in solving problems with high accuracy and convergence rates, there is still a number of aspects to be qualitative and quantitatively investigated. Among these are: the convergence sensitivity to the weight functions used in the Moving Least Square approximation of the interpolation functions, the sensitivity to the class of enrichment functions used in the *p*-adaptivity and the behaviour of the condition number.

Although the real motivation is three-dimensional structural dynamics, this paper reports numerical experiments regarding some of the many choices allowed by the meshless *hp*-Clouds methodology applied to static Timoshenko beam problems. Since the Moving Least Square Method is used to generate the partition of unity, some choices of weighting are studied and the results compared against each other. In addition, convergence results are presented for successive *h*-refinements, when the number of clouds is increased, and for increasingly higher order interpolation functions characterizing *p*-refinements. Since the new basis functions differ from the traditional polynomial ones, an adaptive integration procedure is employed. The efficiency of several types of basis functions is verified. The rates of *h* and *p* convergence are determined as functions of other parameters. Also, examples of degradation of the stiffness matrix condition number is displayed and discussed.