



Mesh size effect on the dynamic response of engineering structures using numerical methods

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Numerical methods like the Finite Element Method or Finite Difference Method are popular in the analysis of engineering structures which are submitted to dynamic impact that induce wave propagation. Dynamic impact for structures often emanate from earthquake and blasting. The waves which propagate as a result of these actions stay only for short durations. Because of the extremely short duration of the resulting waves and the energy transmission is accomplished through the different sized grids in the numerical modeling, the numerical results are sensitive to the finite element mesh size. Practical experiences in numerical simulations show that a mesh size which fits to one dynamic impact might not be appropriate for another case dictating that the convergence criterion of a numerical model with a given numerical mesh size might not be enough to guarantee accurate numerical simulation results. Therefore, both coarse mesh and fine mesh are used in different dynamic loading cases to investigate the mesh size effect on numerical results of impact wave propagation and interaction with structures. Based on the numerical results, the effects of mesh size used in the numerical modeling of engineering problems on the accuracy of the results are discussed. Moreover, the practical implication of the mesh size with reference to waves coming from earthquake action and hence natural hazards are explained and outlined.

Keywords: Dynamic impact, Earthquake, Numerical modeling, mesh size, convergence criterion