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Simulation of Wave Propagation in Multiphase Medium

Authors : Edip Kemal, Sheshov Vlatko, Bojadjieva Julijana, Bogdanovic ALeksandra, Gjorgjeska Irena

Abstract : The wave propagation phenomenon in porous domains is of great importance in the field of geotechnical earthquake engineering. In these kinds of problems, the elastic waves propagate from the interior to the exterior domain and require special treatment at the computational level since apart from displacement in the solid-state there is a p-wave that takes place in the pore water phase. In this paper, a study on the implementation of multiphase finite elements is presented. The proposed algorithm is implemented in the ANSYS finite element software and tested on one-dimensional wave propagation considering both pore pressure wave propagation and displacement fields. In the simulation of porous media such as soils, the behavior is governed largely by the interaction of the solid skeleton with water and/or air in the pores. Therefore, coupled problems of fluid flow and deformation of the solid skeleton are considered in a detailed way.

Keywords : wave propagation, multiphase model, numerical methods, finite element method
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