عنوان مقاله:

Three dimensional vibration analysis of a fluid-filled buried pipeline with slip conditions

محل انتشار:

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خلاصه مقاله:

The governing equations of an infinite buried pipeline and soil media as a coupled soil-pipeline system are solved. Pipe exposed to an incident plane wave and the slip condition between the pipeline and soil medium is considered by assuming the Coulomb frictional-force on their interface. The problem is then extended to solve the filed equations of inner invisid and ideal compressible fluid of pipe which is initially at rest. The interaction between soil and pipe and its inner fluid is studied by considering the continuity and slip conditions at the interface between soil and pipe and the boundary conditions on the inner surface of the pipe. Application of the above-mentioned continuity and boundary conditions leads to a system of algebraic equations which is solved numerically to determine the unknown constants and the phase difference of the slip displacements using a trail and error method. Non-dimensional axial and angular slippages of outer surface of the pipe are compared and also the results are compared for two different soil media. The minimum and the maximum value of the incident-wave amplitude, which are necessity for the slip and yield occurrence respectively, are estimated to find the bounds of the amplitude of incident wave for the slippage of pipe and the validity of elastic solution. To ensure the appropriateness and validation of the solution, the residual of the .continuity and boundary equations are plotted. Contours of pipe inner fluid pressure and velocity filed are obtained

کلمات کلیدی:

Soil-Pipeline System, Slip Conditions, Isotropic Material, Plane Wave, Invisid And Ideal Compressible Fluid