

The Displacement Field Generated by Tractions Applied to the Surface of a Cylindrical Cavity in an Elastic Medium

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Abstract: *Most of the practical problems which arise in Engineering exhibit certain essential features which preclude exact analytical solutions. Some of these features are awkward boundary shapes and non-linear boundary conditions at known or in some cases unknown boundaries. Thus, it is often necessary to resort to approximations, numerical solutions or combinations of both. The advent of fast and large digital computers, has led to recent advances in the development of a variety of numerical methods of solution to these problems. However, well known numerical methods such as the Finite Difference method, Finite element method and the method of least squares, pose serious and often insurmountable difficulties when they are implemented for the solution of problems with domains having awkward boundaries or when the problem domain is of an infinite extent. In this paper, a numerical method is presented for the evaluation of the displacement field generated in an infinite elastic medium as a result of time-harmonic tractions applied to the surface of an embedded infinite cylindrical cavity whose cross-section has an arbitrary shape. Mapping is used to condense the physical problem domain. Transformed field equations are expressed in finite-difference forms and solved in a rectangular region.*

Keywords: *Tractions, cylindrical cavity, finite element method, least squares, elastic medium*