A Finite Element Approach to Truncate a 3D Elastic Half Space

LTC Krista Watts
United States Military Academy
West Point, New York 10996

Dr. Clyde Scandrett
Naval Postgraduate School
Department of Applied Mathematics
Monterey, California 93933

ABSTRACT

A time dependent, three dimensional finite element approach to the development of a perfectly matched layer for numerical calculations of surface wave radiation in a half space is presented. The development of this new element requires the coupling of a system of linear, second-order, partial differential equations which describe elastic wave propagation into a single weak-form (Galerkin) wave equation, from which the characteristics of a composite finite element matching layer were derived. Time marching is done via a one step explicit algorithm for solving primary variables without matrix inversion or iterative sub steps. This work develops a methodology for finite analysis of three-dimensional, semi-infinite, time-dependent elasto-dynamic problems.

KEYWORDS: Perfectly Matched Layer, Elasto-Dynamic, Galerkin, TimeDependent, Finite Element

CONTACT: LTC Krista Watts, MSCE, United States Military Academy, West Point, New York 10996. Email: Krista.Watts@usma.edu TEL: 845-938-7685.