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# Perfectly Matched Layer Boundary Stabilized Using Multiaxial Stretching Functions

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**Abstract :** Numerical modeling of dynamic soil-structure interaction problems requires an adequate representation of the unbounded characteristics of the ground, material non-linearity of soils, and geometrical non-linearities such as large displacements due to rocking of the structure. In order to account for these effects simultaneously, it is often required that the equations of motion are solved in the time domain. However, boundary conditions in conventional finite element codes generally present shortcomings in fully absorbing the energy of outgoing waves. In this sense, the Perfectly Matched Layers (PML) technique allows a satisfactory absorption of inclined body waves, as well as surface waves. However, the PML domain is inherently unstable, meaning that it its instability does not depend upon the discretization considered. One way to stabilize the PML domain is to use multiaxial stretching functions. This development is questionable because some Jacobian terms of the coordinate transformation are not accounted for. For this reason, the resulting absorbing layer element is often referred to as "uncorrected M-PML" in the literature. In this work, the strong formulation of the "corrected M-PML" absorbing layer is proposed using multiaxial stretching functions that incorporate all terms of the coordinate transformation. The results of the stable model are compared with reference solutions obtained from extended domain models.

**Keywords :** mixed finite elements, multiaxial stretching functions, perfectly matched layer, soil-structure interaction
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