First Pan American Congress on Computational Mechanics
PANACM 2015
April 27-29, 2015, Buenos Aires, Argentina

On a Position Aware Viscoelastic (PAVE) Model for Peridynamics

(SAND2014-18506 A)

John A Mitchell[1]

[1]Sandia National Laboratories, P.O. Box 5800, MS1322, Albuquerque, NM 87185
jamitch@sandia.gov

ABSTRACT

Perhaps the most ubiquitous ordinary constitutive model is the isotropic linear peridynamic solid (LPS) [1]. In this model, the bulk modulus from the local theory of linear elasticity is used directly while the shear modulus is scaled by equating the elastic energy density from the local theory with the elastic energy density of the linear peridynamic solid model. Unfortunately, this scaling is only applicable under the assumption that the material point in question is within the 3D bulk. This latter assumption is violated for points near or on the surface of a solid model and can significantly spoil convergence of the numerical solution. This surface effect is generally unique for each point within the body because each point has a relatively unique geometric proximity to the surface. Proposed solutions reflect the position/location of each point and hence the name 'Position Aware.' A new position aware linear solid (PALS) model has recently been developed. Using the PALS model, demonstration calculations on simple benchmark problems show a sharp reduction in error relative to the LPS model. In this talk/presentation, work towards using position aware concepts for a viscoelastic model will be discussed and presented. The new position aware viscoelastic (PAVE) model is an ordinary-state-based constitutive model which extends the viscoelasticity model [2] to include some PALS [3] model features.

REFERENCES

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