A variational flux recovery approach for elastodynamics problems with interfaces

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ABSTRACT

We present a new explicit algorithm for linear elastodynamic problems with material interfaces. The method discretizes the governing equations independently on each material subdomain and then connects them by exchanging forces and masses across the material interface. The exchanged quantities approximate the surface traction force between the material subdomains, which provides a Neumann boundary condition for the subdomain problems. Variational flux recovery techniques motivate the formulation of the mass and force exchanges.

The new algorithm has attractive computational properties. It allows different discretizations on each material subdomain and enables partitioned solution of the discretized equations. This makes it possible to also use the algorithm as a coupling tool for different codes operating in different material subdomains. The method passes a linear patch test and recovers the solution of a monolithic discretization of the governing equations when interface grids match. Numerical examples illustrate these properties and show that the method is second-order accurate.

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