VARIATIONS ON AN INTERFACE THEME

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Abstract. We present two complementary coupling approaches for problems with interfaces. The first algorithm addresses explicit partitioned solution of elastodynamics problems. 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 second approach uses optimization and control ideas to formulate a new coupling algorithm for problems involving spatially non-coincident meshes. Our approach couches the coupling into a virtual control formulation in which a Neumann control is introduced on a parameterized common refinement of the two subdomains' version of the discretized interface. The weights associated with transferring a control defined on the common refinement to subdomain interfaces is determined in a way that enforces global flux conservation for all choices of controls.

Keywords: Partitioned solvers, interface problems, non-coincident grids, finite elements.

Mathematics Subject Classifications (2010): 65N30, 65K10

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[1]Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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