Partitioned Symmetric Formulation and Solution Algorithms of Thermoelastic Interaction Problems

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ABSTRACT

A partitioned formulation of transient coupled thermoelastic problems is presented, which yields a four-field symmetric set of partitioned governing equations. The present formulation can be reduced to conventional two-field non-symmetric coupled thermoelastic equations [1]-[4] as a spacial case, thus validating the present partitioned formulation. A key feature of the present formulation is the addition of the constraint enforcement of energy exchanges between the elastic body and the thermal conduction body, each of which occupying the same volume space. The variational formulation of the elastic body and the thermal conduction part is independently constructed as if they are uncoupled. Various solution algorithms are suggested including explicit-implicit, implicit-implicit time integration strategies. The present work may be considered as an extension to our earlier work on general partitioned formulation for coupled-field problems as summarized in[5].

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