

Recursive Multi-Time-Step Coupling of Multiple Subdomains

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The need for efficient computation methods for modeling of large-scale structures has become critically important over the past few years. Efficient means of analysis often involve coupling in space through domain decomposition and multi scale methods in time. The multi-time-step coupling method is a coupling method in time which allows for efficient analysis of large-scale problems for structural dynamics where a large structural model is decomposed into smaller subdomains that are solved independently and then coupled back together to obtain the global solution. For coupling of more than two subdomains that are solved at different timesteps, we employ recursive methods. Currently a constraint on this recursive coupling is that subdomains with the same time-step must be coupled first before coupling with other subdomains of different time steps. In this research, we develop a computational algorithm to overcome this constraint and allow the user to specify general coupling orders for the different subdomains. Our efforts till now have been directed towards coding the recursive coupling of multi-subdomain models and we have verified that the equations that will allow us to overcome coupling constraint are correct. We are in the process of implementing these equations into our codes. Once in place, these sets of codes will allow users to conduct simulation of structural dynamics in a very efficient manner.