PROVABLY SECOND-ORDER TIME-ACCURATE LOOSELY COUPLED SOLUTION ALGORITHMS FOR TRANSIENT NONLINEAR COMPUTATIONAL AEROELASTICITY

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A methodology for designing formally second-order time-accurate and yet loosely coupled partitioned procedures for the solution of nonlinear fluid-structure interaction (FSI) problems on moving grids is presented. Its key components are a fluid time-integrator that is provably second-order time-accurate on moving grids, the midpoint rule for advancing in time the solution of the structural dynamics equations of motion, and a parameterized predictor for updating the motion of the fluid mesh and addressing time-accuracy and/or conservation of energy transfer at the fluid-structure interface boundary. Following this methodology, two different loosely coupled schemes are constructed for the solution of transient nonlinear FSI problems and *proved* to be second-order time-accurate and third-order energy transfer conserving. Three-dimensional numerical simulations of the aeroelastic response of a complete F-16 configuration to a gravity excitation are also presented to confirm the practical significance of the theoretical results exposed in this paper, and highlight their impact on nonlinear computational aeroelasticity.