Flexible Inhibitor Fluid-Structure Interaction Simulation in RSRM. BONO WASISTHO, ALI NAMAZIFARD, ROBERT FIEDLER, Center for Simulation of Advance Rockets, University of Illinois at Urbana Champaign — We employ our tightly coupled fluid/structure/combustion simulation code 'Rocstar-3' for solid propellant rocket motors to study 3D flows past rigid and flexible inhibitors in the Reusable Solid Rocket Motor (RSRM). We perform high resolution simulations of a section of the rocket near the center joint slot at 100 seconds after ignition, using inflow conditions based on less detailed 3D simulations of the full RSRM. Our simulations include both inviscid and turbulent flows (using LES dynamic subgrid-scale model), and explore the interaction between the inhibitor and the resulting fluid flow. The response of the solid components is computed by an implicit finite element solver. The internal mesh motion scheme in our block-structured fluid solver enables our code to handle significant changes in geometry. We compute turbulent statistics and determine the compound instabilities originated from the natural hydrodynamic instabilities and the inhibitor motion. The ultimate goal is to studdy the effect of inhibitor flexing on the turbulent field.

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