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Fluid structure interaction (FSI) is ubiquitous in energy generation, environmental management and defense engineering applications of international interest. The development of blast mitigating structures is critical to the success of these engineering solutions. A central problem in the design of blast mitigating structures is the accurate and predictive simulation of FSI phenomena featuring large displacements, plastic deformation, and fracture. In 2009, the work flow of AMROC-DYNA within the Virtual Test Facility FSI Suite was verified, validated, and improved. AMROC-DYNA is the result of coupling the fluid solver within the Adaptive Mesh Refinement in Object Oriented C++ code with the finite element solver within DYNA3D.

Development of the AMROC-DYNA framework will continue during summer 2011. The verification configurations were rather prototypical. The impact of a planar shock on a homogeneous elastic steel panel and the bulging of a thin aluminum plate were investigated. Configurations will be studied that are closer to realistic blast wave scenarios to answer questions such as: How will the blast wave propagate through a building if an explosion occurs in front of it? What is the loading on the structure? Which wall will fail first and how should it be improved? Whether the spread and impact of small fragments driven by a blast wave can be simulated by AMROC-DYNA and how well the code scales for complicated geometries and blasts will also be investigated.

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