AIR SHOCK DRIVEN FLUID-STRUCTURE INTERACTION: VERIFICATION AND VALIDATION CONSIDERATIONS

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A fluid-structure interaction case study is presented. An experimental study of an air shock interacting with a sphere suspended in a vertical shock tube reported pressure histories at several points on the surface of the sphere and the drag on the sphere. These experimental results form the basis of a fluid-structure interaction model accuracy assessment. Since the pressure and drag measurements were independent, favorable simulation result comparisons provide a degree of confidence in the modeled fluid-structure interaction interface. In additional to simulating the elastic sphere used in the experiments, a comparative study is performed with a 'rigid sphere' realized by modifying the shock tube geometry to include a spherical boundary, and thus eliminating the fluid-structure interface. The model of the air shock is verified by comparison with an analytical solution know as Sod's Problem. The analytical and experimental results presented provide a basis for interested others to perform verification and validation studies related to fluid-structure interaction.