

## Analysis of Structure-Flow Interaction for Water Brake Mechanism

**Authors :** Murat Avci, Fatih Kosar, Ismail Yilmaz

**Abstract :** In this study, structure-flow interaction for water brake mechanism is studied with Abaqus CEL approach. The water brake mechanism is used for dynamic systems such as sled system on rail. For the achievement of these system tests, structure-flow interaction should be investigated in detail. This study is about a sled test of an aircraft subsystem which rises to supersonic speeds thanks to rocket engines. To decrease or to stop the thrusting rocket sleds, water brake mechanisms are used. Water brake mechanism provides the deceleration of the structures that have supersonic speeds. Therefore, structure-flow interaction may cause damage to the water brake mechanism. To verify all design revisions with system tests are so costly so that some decisions are taken in accordance with numerical methods. In this study, structure-flow interaction that belongs to water brake mechanism is solved with Abaqus CEL approach. Fluid and deformation on the structure behaviors are modeled at the same time thanks to CEL approach. Provided analysis results are corrected with the dynamic tests. Deformation zones seen in numerical analysis are also observed in dynamic tests. Finally, Johnson-Cook material model parameters used for this analysis are proven, and it is understood that these parameters can be used for dynamic analysis like water brake mechanism.

**Keywords :** aircraft, rocket, structure-flow, supersonic

**Conference Title :** ICAMCMS 2019 : International Conference on Advanced Motion Control and Mechanical Systems

**Conference Location :** Prague, Czechia

**Conference Dates :** September 05-06, 2019