Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

**Design and identification of high performance steel alloys for structures subjected to underwater impulsive loading** XIAODING WEI, FELIX LATOURTE, ZACK FEINBERG, GREGORY OLSON, HORACIO ESPINOSA, MICRO AND NANOMECHANICS LABORATORY TEAM, OLSON GROUP TEAM — To characterize the performance of naval structures, underwater blast experiments have been developed. Martensitic and austenitic steel alloys were designed to optimize the performance of structures subjected to impulsive loads. The deformation and fracture characteristics of the designed steel alloys were investigated experimentally and computationally. The experiments were based on an instrumented fluid structure interaction apparatus, in which deflection profiles were recorded. The computational study was based on a modified Gurson damage model able to accurately describe ductile failure under various loading paths. The model was calibrated for two high performance martensitic steels (HSLA-100 and BA-160) and an austenitic steel (TRIP-120). The martensitic steel (BA-160) was designed to maximize strength and fracture toughness while the austenitic steel (TRIP-120) was designed to maximize uniform ductility. The combined experimental-computational approach provided insight into the relationships between material properties and blast resistance of structures.

Xiaoding Wei

Date submitted: 17 Feb 2011 Electronic form version 1.4