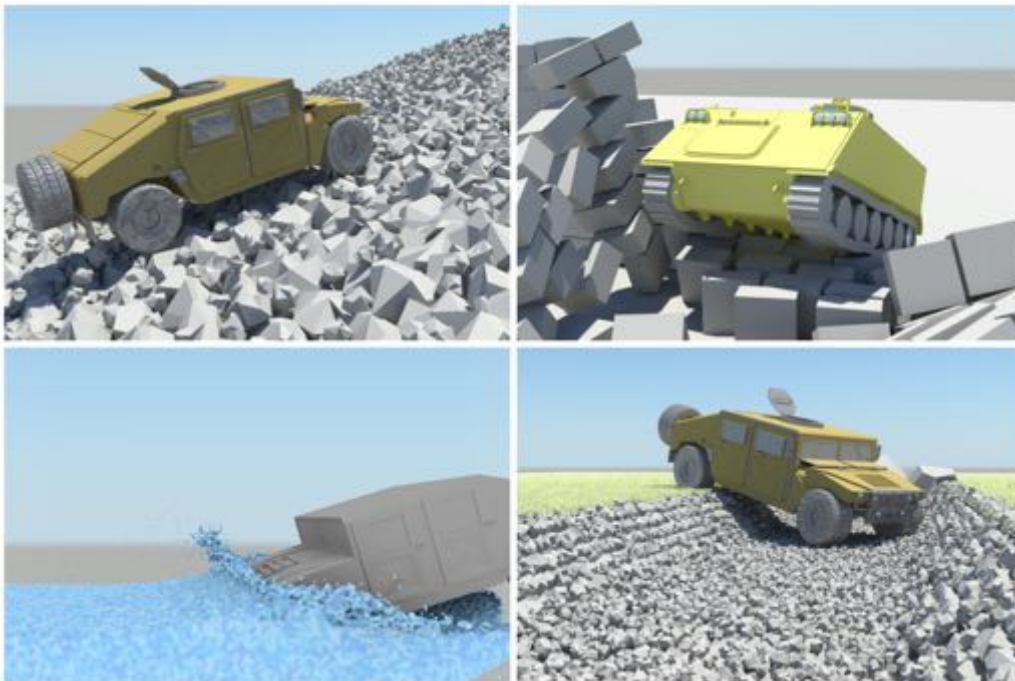


## Project Chrono – An open source framework for the dynamics analysis of many-body systems

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This presentation outlines an HPC-enabled software infrastructure that aims at supporting physics-based simulation in Computer Aided Engineering. The computational dynamics applications targeted for modeling and simulation include granular dynamics, rigid/flexible many-body dynamics, and fluid-solid interaction problems. The cornerstone of the Chrono software infrastructure is a collection of five modules that provide: (a) support for multi-physics modeling; (b) scalable numerical methods for GPU and multi-core hardware architectures; (c) methods for proximity computation and collision detection; (d) support for dynamic interconnect-based data exchange and inter-process communication; and (e) tools for carrying out visualization and post-processing in a distributed manner. Several engineering applications will be used to demonstrate how these five components are implemented to leverage a heterogeneous CPU/GPU cluster operated by the Simulation-Based Engineering Lab at UW-Madison. The talk will conclude with a brief discussion of current trends in high performance computing and how they are poised to change the field of Computational Science.

