WaveTracker 3D: Speed and Accuracy in Detonation Shock Wave Modeling

Published date: Aug. 14, 2019

Technology description

WaveTracker3D is the first turnkey software application built specifically for explosive engineering models. It implements a new hybrid method to provide accurate detonation shock wave models within practical time limits.

Accurately modeling detonation shock fronts is a critical challenge for explosive engineers in aerospace, defense, mining, drilling, and demolition. Currently available level set-based models use a computationally intensive process to model every point on a defined plane, resulting in extreme accuracy at speeds so slow that many users never run high resolution models at all.Particle-based models run more quickly, but are difficult to implementand likely to miss splits and merges in the wave front.

WaveTracker3D is the first turnkey software application built specifically for explosive engineering models. It implements a new hybrid method to provide accurate detonation shock wave models within practical time limits. This Detonation Shock Dynamics (DSD) model provides level set accuracy with times comparable to particle-based models, so researchers no longer have to choose between precision and speed.

DESCRIPTION/DETAILS

Dr. Scott Stewart and Dr. Sunhee Yoo created the algorithms used by WaveTracker 3D to enable better modeling in their detonation shock front research. The novel hybrid algorithm calculates level set points only in regions near the physical shock surface, using particle representation to interpolate onto the rest of the underlying grid. This dramatically reduces the computational intensity of the modeling process, and the resultant processing time, without a meaningful reduction in the precision of the model. Speed and accuracy meets convenience in WaveTracker 3D, the first explosive modeling solution available in a turnkey software package.

Application area

Aerospace

Defense

Mining / Oil Drilling

Demolition

Explosion protection design
Materials processing
Medicine
Pulsed power
Micro-cutting

Advantages

Software created specifically for explosive engineers
Models detonation shock fronts accurately in a fraction of the time used by the unbanded level-set method
Runs on Windows and Unix-based systems
Outputs time of arrival data for built-in visualization with OpenGL or external visualization software
Includes user manual and worked examples for rapid familiarization

Institution

University of Illinois, Urbana-Champaign

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com