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Numerical simulation of projectile penetrating concrete target using SPH-lag range coupled method

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This paper demonstrates the use of two different numerical simulation methods for predicting the penetration and deceleration over time of a high velocity projectile (276 m/s to 456 m/s) penetrating into a high strength concrete target with a confined pressure of 39 MPa. Lagrangian formulation with 3D solid Finite Elements and Smooth Particle Hydrodynamics coupled with Lagrangian Finite Elements (SPH-FE) are chosen for the discretization of the simulation problem. In the SPH-FE method, SPH formulation, a mesh less method, is used to model the area of penetration and the remaining part of the structure using finite elements. This helps to avoid mesh problem and also largely reduced the total computational resources compared to only finite elements are used to model penetration problem. Results from both simulation methods are compared to experimental results from Forrestal et al and show good correlation. With the appropriate technique of the SPH-FE method, a robust and efficient numerical solution is provided to solve penetration and perforation simulation problem.

Biography

Xin Pang is in pursuit of his Ph.D. at Nanyang Technological University. He has previously completed a joint collaboration project between Singapore Technologies Kinetics and Nanyang Technological University .

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