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# Smoothed particle hydrodynamics modeling of high velocity impact on thin plates.

H. Frissane[1,*], L. Taddei[1], S. Meng[1], N. Labaal[1], and S. Roth[1]

[1] Laboratoire Interdisciplinaire Carnot de Bourgogne/ Site UTBM, UMR CNRS 6303/ Univ. Bourgogne Franche Comté (UBFC), F-90010 Belfort, France
[*] Corresponding author: hassan.frissane@utbm.fr. Tel: +33 (0)3 84 58 20 16; Fax.: +33 (0)3 84 58 32 86.

The high velocity impact (HVI) framework with or without penetration, leads to take into consideration a large plastic deformation, damage phenomenon, material ruptures. In this paper, the penetration of metal plates impacted by a projectile are simulated numerically using a meshfree particle method (SPH). A 3D home made code is used in this investigation for studying these phenomena. The Johnson-Cook elastic-plastic model as well as Johnson-Cook damage model are applied in this study. The results obtained at different impact velocities and for different geometry of the projectile, were provided, and were close to the experimental data.

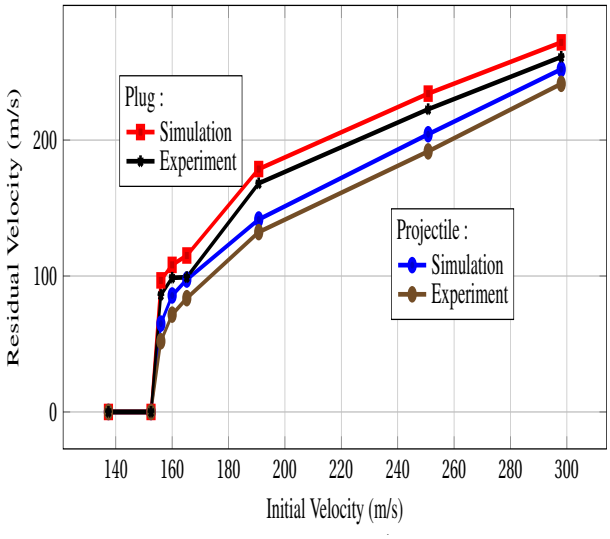


Figure 1: Residual velocities vs Impact velocities for projectile and plug for 8 mm thick Weldox 460 E steel plate.

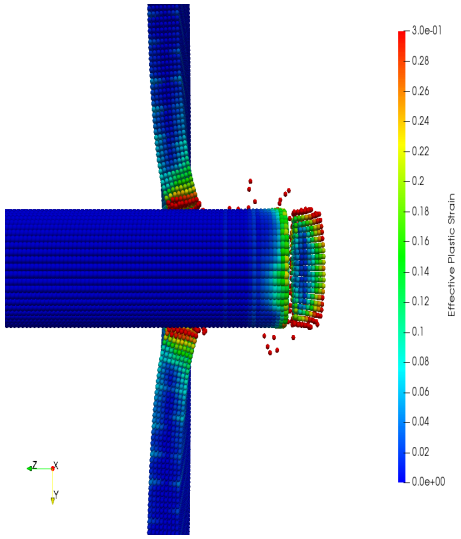


Figure 2: Effective plastic produced by an impact of a 20 mm diameter, 197 g Arne tool steel cylinder into a 8 mm thick Weldox 460 E plate.

In order to treat the management of contact problems, which is an essential point in (HVI) simulation involving structures, a penalty force algorithm was included. To overcome the time simulation cost, which is very critical with SPH simulation, it used the acceleration of SPH using a graphics processing unit (GPU) enabling large numbers of particles (2-5 million) on a single GPU card.