SLIDING BOUNDARIES IN FINITE ELEMENT MODELLING OF SOFT MATERIALS UNDER BLAST LOADS

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Abstract: Experimental testing of low bending-stiffness materials against impulsive loads, like blast or ballistic impact, is a challenging feat. Often, the out of plane displacement is accompanied by in-plane inward material stress waves that bounce at the boundaries of the specimen. In fully-clamped configurations, this can result in materials slipping from the clamping device. Depending on the impulse load levels, the observed slippage may be significant. By applying tighter clamping forces, the slippage can be moderated up to a point; exceeding it, the clamping device may actually damage the specimen. In many cases, the slippage is an unavoidable side-effect when testing soft materials against impulsive loads. This, in turn, may complicate further analysis using Finite Element Simulations. The present paper, investigates alternative strategies in modelling sliding boundaries of an aramid fabric against blast loads using the finite element software LsDyna. The results are compared with experimental tests at different blast overpressure levels.