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EXPERIMENTAL AND NUMERICAL INVESTIGATION OF MULTIPLE SHEAR BANDS IN COLLAPSING CYLINDERS

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Abstract

The formation of shear bands in collapsing thick walled cylinders occurs in a spontaneous manner. The advantage of examining spontaneous shear localization, unlike forced shear localization, is that it highlights the inherent susceptibility of the material to adiabatic shear banding. The Thick-Walled Cylinder technique, reported in the literature, uses an explosive cylinder to create the driving force, collapsing the cylindrical sample. This experimental set-up has been established as a controlled and repeatable technique to create and study multiple adiabatic shear bands. We are using an electro-magnetic set-up to provide the collapsing force on the cylindrical specimens. The main diagnostics is post-mortem: the collapsing cylinders, which come to a stop at the end of the experiment, are cut and polished to reveal the spatial distribution of shear bands. 2D numerical simulations are carried out to reproduce the experimental results for both explosively driven and EM driven experiments.

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