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Numerical investigation of multiple shear bands in collapsing Thick-Walled Cylinders ZEV LOVINGER, RAFAEL, DANIEL RITTEL, Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, ZVI ROSENBERG, RAFAEL — The ability to simulate evolution of shear bands in TWC experiments is a powerful tool for studying the complex problem of multiple adiabatic shear bands' formation and propagation. We carry out 2D numerical simulations to reproduce experimental results of multiple shear bands in cylindrical specimens collapsed by electro-magnetic driving forces. In order to simulate the shear bands we use a shear failure model which incorporates a positive feedback mechanism. Alternatively, we use for the Johnson-Cook strength model an enhanced thermal softening term, reaching similar behavior. We present a detailed study of the numerical model, exploring its ability to properly reproduce the evolution of the multiple shear-bands. The influence of initial perturbations, mesh size and pressure history on the initiation and final stages is investigated. Analyzing the shear band distribution, we use an empirical distribution function (ECDF) to reach a quantitative measure to compare simulation and experimental results. Finally, we compare the experimental shear band distribution to our simulations' results, showing good agreement.

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