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Challenges in the Hydrocode Modelling of Hopkinson Bar Tests on Polymeric specimens RORY CORNISH, PHIL CHURCH, PETER GOULD, QinetiQ, CAMRBIDGE UNIVERSITY SHOCK PHYSICS TEAM, QINETIQ HOPKINSON BAR TEAM, QINETIQ WES TEAM — QinetiQ has developed physically based material models that can predict the mechanical and failure response of polymer composites, at high and low levels of stress and strain rate. Previous experience of using the Hopkinson bar to validate such models has suggested that direct comparison with the measured wave output is preferable due to the lack of equilibrium during the test. The presence of large oscillations in the predicted stress strain results are explained in terms of Poisson's ratio. A Bancroft dispersion analysis demonstrates that the source of these oscillations is Pochhammer-Chree waves generated in the Hopkinson bars. The intermittent and rare nature of similar oscillations observed experimentally is suggested to be due to the precise conditions of impact and shape of the striker and incident bars. It is shown that by accounting for these effects and by refining the validation process, excellent levels of agreement between prediction and experiment are obtained.

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