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Stability and convergence of a finite element simulation of a tensile test EZEKIEL HADLEY, CAVENDISH MCKAY, Marietta College — We study the effects of element formulation, size, and resolution on the rate of convergence and computational cost of a finite element simulation of a tensile test involving thin strips of plastic resin. We find that tetrahedral elements outperform hexahedral elements both in terms of rate of convergence as well as computational cost, even though the overall element count is higher in the tetrahedral mesh. Resolution requirements for convergence are significantly different in the directions parallel to and across the applied tension. Simulations using the commercial finite element solver LS-DYNA show both convergence and performance results to be consistent across four different material definitions, and over a large range of material parameters. Some discussion of instabilities associated with the extreme aspect ratio of our test samples will also be included.

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