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Computer modeling of dynamic necking in bars YEHUDA PARTOM, AVISHAY LINDENFELD, RAFAEL — Necking of thin bodies (bars, plates, shells) is one form of strain localization in ductile materials that may lead to fracture. The phenomenon of necking has been studied extensively, initially for quasistatic loading and then also for dynamic loading. Nevertheless, many issues concerning necking are still unclear. Among these are: 1) is necking a random or deterministic process; 2) how does the specimen choose the final neck location; 3) to what extent do perturbations (material or geometrical) influence the neck forming process; and 4) how do various parameters (material, geometrical, loading) influence the neck forming process. Here we address these issues and others using computer simulations with a hydrocode. Among other things we find that: 1) neck formation is a deterministic process, and by changing one of the parameters influencing it monotonously, the final neck location moves monotonously as well; 2) the final neck location is sensitive to the radial velocity of the end boundaries, and as motion of these boundaries is not fully controlled in tests, this may be the reason why neck formation is sometimes regarded as a random process; and 3) neck formation is insensitive to small perturbations, which is probably why it is a deterministic process.

Yehuda Partom
RAFAEL

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