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Dynamic crack propagation through nanoporous media THAO NGUYEN, JUSTIN WILKERSON, University of Texas at San Antonio — The deformation and failure of nanoporous metals may be considerably different than that of more traditional bulk porous metals. The length scales in traditional bulk porous metals are typically large enough for classic plasticity and buckling to be operative. However, the extremely small length scales associated with nanoporous metals may inhibit classic plasticity mechanisms. Here, we motivate an alternative nanovoid growth mechanism mediated by dislocation emission. Following an approach similar to Lubarda and co-workers, we make use of stability arguments applied to the analytic solutions of the elastic interactions of dislocations and voids to derive a simple stress-based criterion for emission activation. We then propose a dynamic nanovoid growth law that is motivated by the kinetics of dislocation emission. The resulting failure model is implemented into a commercial finite element software to simulate dynamic crack growth. The simulations reveal that crack propagation through a nanoporous media proceeds at somewhat faster velocities than through the more traditional bulk porous metal.

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