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Meso-scale Harmonic Analysis of Homogenous Dislocation Nucleation. ASAD HASAN, CRAIG MALONEY, Carnegie Mellon University — Under sufficiently high loads dislocations will be nucleated in perfect crystals. A typical scenario is the nano-indentation of a defect-free metal. An outstanding issue is the prediction of where and under what loads nucleation will occur. Many criteria have been put forward which address this question, some in terms of the local stress field, others in terms of the local tangent stiffness of the material. More recently it has been questioned whether a local criterion can be used at all [1]. We address the locality of the nucleation process via analysis of molecular dynamics simulations in terms of the vibrational eigenmodes of the mesoscale regions of the crystal for various model systems. [1] R.E. Miller and D. Rodney, J. Mech. Phy. Solids 56(4) 1203-1223, 2008.

Asad Hasan
Carnegie Mellon university

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