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Experiment and Quasicontinuum Simulation of Nanoindentation in Copper

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Experiment and quasicontinuum simulation of nanoindentation in fcc copper are performed. The indented material is a single crystal. Indentation is accommodated by elastic deformation of the surface, up to an indenter displacement of about 6 Åand by nucleation of crystalline defects for deeper indents. The critical load for the event is computed and the nucleation is observed. The result is compared with experimental data. The comparison conveys the conclusion that incipient plasticity is induced at much earlier times and much smaller loads than observed in nanoindentation experiment, and the measured instabilities are collective events involving a large number of pre-existing dislocations.

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