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On direct estimation of hardening exponent in crystal plasticity from the spherical indentation test

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## Highlights

- We find hardening exponent in crystal plasticity from spherical indentation test
- The procedure is based on finite element study of deformed surface topography
- Hardening exponent is strongly correlated with anisotropic pile-up/sink-in pattern
- New hardening exponent indicator is defined as ring-based pile-up/sink-in volume
- Experimental verification by compression of Cu single crystal is satisfactory

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