

## Interfacial Jump Conditions in Strain-Gradient Plasticity and Relations of Hall-Petch Type

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Strain-gradient plasticity requires boundary conditions, and jump conditions across interfaces, additional to those required in ordinary plasticity. In the work to be described, we penalise dislocations crossing the interface by admitting an interfacial potential that is a function of the plastic strain; this induces a jump in the higher-order traction, which is analogous to allowing dislocations to pile up. The theory is illustrated by a number of simple one-dimensional examples. The microstructure is taken to be periodic and the homogenised, or effective, response is studied by taking the total strain to be periodic with prescribed mean value; the plastic strain is likewise periodic but its mean value is obtained from the solution. A pronounced scale-dependence of effective flow stress – a kind of Hall–Petch relation – is obtained in every case. Work in progress includes allowance for randomly-distributed interfaces, and extension to problems in two and three dimensions.

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