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Grain–boundary grooving driven by surface melting ROBERT STYLE, GRAE WORSTER, Institute of Theoretical Geophysics, DAMTP, Cambridge — At temperatures close to the bulk freezing point, many materials form surface melted films when exposed to air or vapour. Flow in these films provides a mechanism for mass transport driven by temperature and curvature effects. Lubrication theory is used to provide a system of equations modelling this flow and an explicit transport coefficient B is derived for flow in a surface melted film. The transport coefficient is found to depend on temperature and diverges as the bulk melting temperature is approached. The equations are applied to the case of a grain–boundary groove, and it is shown that Mullins's classical equation describing grooving driven by gradients in surface curvature is produced asymptotically. It is found that the contact angle at the groove root is modified over a thin boundary layer by a factor depending on the ratio of surface tensions.

Robert Whittaker
ITG, University of Cambridge

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