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Scaling properties of coating flows in rectangular channels ALBERTO DE LOZAR, ANDREW HAZEL, ANNE JUEL, University of Manchester — We present an experimental and numerical study of the aspect- ratio dependence of two-phase displacement flows in channels of rectangular cross-section. In square and near-square channels, the bulk features of the flow appear to be virtually independent of aspect ratio, α, so that the capillary number, Ca, is the only governing parameter. Saffman-Taylor fingering, governed by the modified capillary number, $1/B \propto Ca\,\alpha^2$, is observed for $\alpha > 7$. For channels of intermediate aspect ratio, the interfacial flow depends solely on a generalised modified capillary number consistent with both limits, $\widehat{\mathrm{Ca}} = f(Ca, \alpha)$, above a threshold value $\widehat{\mathrm{Ca}}_t$.. This novel scaling has tremendous practical significance since it implies that the bulk features of any two-phase displacement flow can be inferred from those of the square channel for $\widehat{\mathrm{Ca}} > \widehat{\mathrm{Ca}}_t$.

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