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Layering, transport and jet formation in rotating, stratified flows with a thermal wind.[1] STEVEN TOBIAS, ADRIAN BARKER, CHRIS JONES, University of Leeds — The Goldreich-Schubert-Fricke (GSF) instability may provide an important contribution to angular momentum transport in planets and stars. We investigate the nonlinear development of the instability, in particular noting the tendency for the transport to be affected by the formation of layers. This is perhaps not surprising as the linear and nonlinear evolution of the equatorial axisymmetric instability is formally equivalent to the salt fingering instability. This is no longer the case in 3D, but we find that the 3D equatorial instability behaves nonlinearly in a similar way to salt fingering. We propose and validate numerically a simple theory for nonlinear saturation of the GSF instability and its resulting angular momentum transport. Away from the equator the nonlinear development is more complicated with layers formed, though these are not perpendicular to the direction of gravity. We conclude by discussing the implications for transport of heat and angular momentum in planets and stars.

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