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Convective overshoot at stiffly stable interfaces BENJAMIN BROWN, University of Colorado, JEFFREY OISHI, Bates College, DANIEL LECOANET, Princeton University, KEATON BURNS, Massachusetts Institute of Technology, GEOFFREY VASIL, University of Sydney — Convective overshoot is an important non-local mixing and transport process in stars, extending the influence of turbulent stellar convection beyond the unstable portions of the atmosphere. In the Sun, overshoot into the tachocline at the base of the convection zone has been ascribed a major role in the storage and organization of the global-scale magnetic fields within the solar dynamo. In massive stars, overshooting convection plays an important role in setting the lifespan of the star by mixing fuel into the nuclear burning core. Here we narrowly consider the properties of convective overshoot across very stiff interfaces within fully compressible dynamics across convection zones with significant stratification. We conduct these studies using the Dedalus pseudospectral framework. We extend prior studies of overshoot substantially and find that the depth of overshoot in DNS simulations of a typical plume is well-predicted by a simple buoyancy equilibration model. The implications of this model, extended into the stellar regime, are that very little overshoot should occur under solar conditions. This would seem to sharply limit the role of the tachocline within the global solar dynamo.

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