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Anchoring entrained tendrils in thermally convecting stratified fluids LAURA SCHMIDT, WENDY ZHANG, University of Chicago — When two stratified, miscible fluid layers undergo vigorous thermal convection, a thin tendril of one fluid can become entrained in the other. A typical tendril is anchored to the interface at one spot and can persist for long times [1]. The persistence of these tendrils may be related to the mechanism anchoring stationary hotspots in the Earth's mantle. We devised a simple model to examine the steady-state entrainment dynamics. The thermal convection is approximated by an axial straining flow and a long-wavelength model is constructed for the flow pattern and tendril profile. Analytical work on asymptotic solutions and their stability leads to conditions on the form of acceptable solutions. We find that to anchor a long-lived tendril, the interface must take the shape of a power-law cusp near the base of the tendril. Even without surface tension, such a cusp shape cannot be produced by only a weak deflection of the interface. [1] Jellinek and Manga, Rev. Geophys., 42, No. 3, RG3002 (2004).

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