



Numerical simulation of double-diffusive convection.

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Semi-convective mixing, as an example of double-diffusive convection, is of general importance in multicomponent fluid mixing processes. In astrophysics it occurs when a mean molecular weight gradient caused by a mixture of light material on top of heavier one counteracts the convective instability caused by a temperature gradient. Previous theoretical work has disagreed on the presence or absence of layer formation. To settle this question high resolution numerical simulations of such a semi-convective system have been performed for the 2D case. A detailed parameter study with varying Prandtl-, Lewis- and Rayleighnumber has been done. Theoretical estimations for the layering process could be validated. It is shown that semi-convection layers form under realistic stability conditions also for a parameter regime relevance to stellar astrophysics.