

Abstract Submitted
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The reality of diffuse volume transport HOWARD BRENNER, MIT

— Whereas mass flow in a continuum is necessarily accompanied by a concomitant volume flow, the converse is not true. That is, volume can be transported independently of mass. In particular, volume can be transported by purely molecular or diffuse action. For example, volume unaccompanied by mass can flow through a fluid that is completely at rest (and hence for which there is no mass flow) provided that density gradients exist. This occurs, for example, during steady-state heat conduction in quiescent isobaric liquids and gases, wherein the density varies locally with the temperature. Equally striking is the fact that volume can be transported through solid walls impermeable to matter. This talk is devoted to analyzing a gedanken experiment permitting these phenomena to be directly visualized, and hence providing undisputable evidence that diffuse volume transport is a real physical phenomenon relevant to continuum fluid mechanics.

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