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Convective - diffusive mixing promoted by natural convection LUIS M. DE LA CRUZ, IGEF - Universidad Nacional Autonoma de Mexico, EDUARDO RAMOS, CIE - Universidad Nacional Autonoma de Mexico — Mixing processes in fluids include two that can be clearly identified, advective and diffusive. We report a theoretical study of combined advective - diffusive mixing of a contaminant inside a cubic cavity with time-dependent boundary conditions. Advective mixing can be achieved by natural convection inside box-shaped cavities by imposing periodic hot and cold temperatures on opposite walls. Using these boundary conditions, no moving walls are required to mix the fluid inside the container. Regardless of the dynamic state of the fluid, a contaminant with an initial non-uniform concentration distribution inside the box will diffuse to smooth out the gradients and attaining asymptotically uniform concentration. Our model is based on the numerical solution of the conservation equations under the boundary conditions described above to generate natural convection. Advective mixing is evaluated with Lagrangian tracking and diffusive mixing is calculated with the Diffusive Strip Method of Meunier and Villermaux. We describe mixing efficiencies for cases dominated by each effect for an initially blob of contaminant.

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