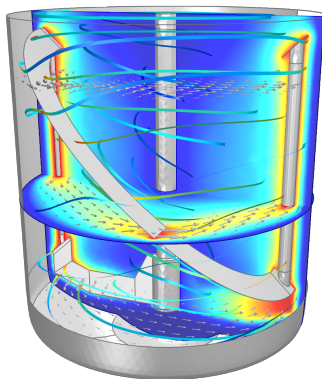# Washington Experimental Mathematics Lab
Randomly Mixing Fluids

Department of Mathematics
University of Washington

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Motivation

Mixing

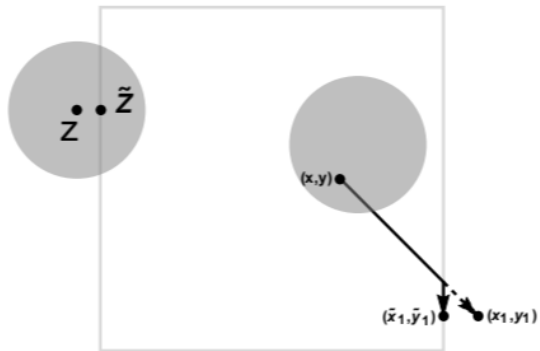Mixing is a combination of advection and diffusion.

Advection is the movement of particles within a fluid via being pulled.

Diffusion is the movement of particles from areas of high density of low density.
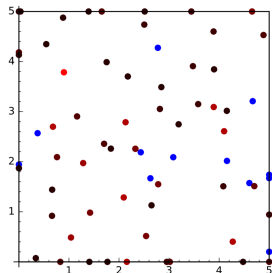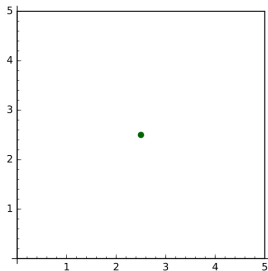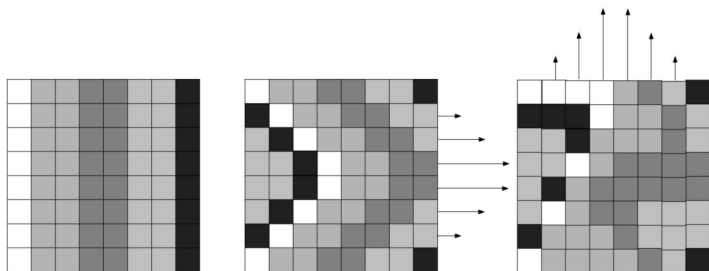
The Random Method

Gather and Spread

Gather and Spread

Toroidal Lattice Mixing

Advection: $(x, y, z) \mapsto (x, y, z) + (s_x(y), s_y(x), 0)$

Diffusion: $(x, y, z) \mapsto$
$\frac{1}{4}((x-1, y, z_1) + (x+1, y, z_2) + (x, y-1, z_3) + (x, y+1, z_4))$