

# Long-Time Simulation of Nuclear Waste Transport

## Scientific Achievement

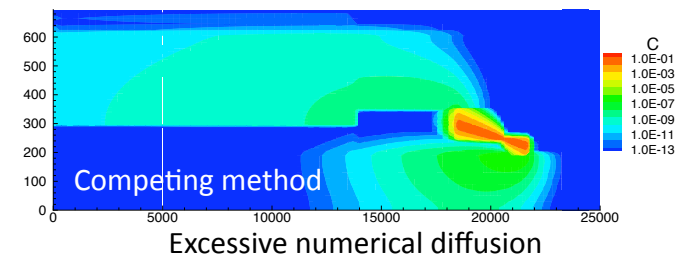
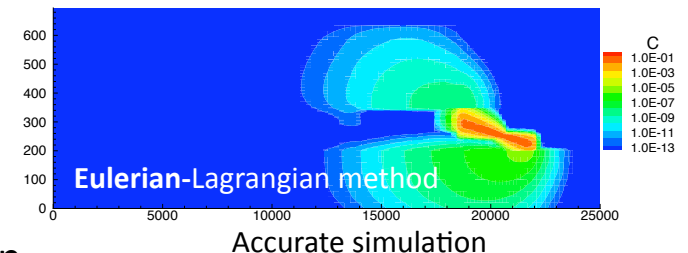
We developed a new Eulerian-Lagrangian method that can be more accurate and efficient than competing methods in certain long-time simulations involving the underground leakage of radionuclide wastes.

## Significance and Impact

Enables accurate assessment of risk to public health through the understanding and prediction of the fate of radionuclides in the subsurface environment.

## Research Details

- Both mass and volume are preserved, so
  - small concentrations are not lost in the computation
  - and reaction dynamics can be computed accurately.
- The simulation can use much longer time steps, resulting in
  - less *numerical diffusion* (i.e., unphysical spreading of a contaminant plume, such as leakage from a repository shown in the figures at 250,000 years of simulation)
  - and much less computational time to complete the one million year simulation.



T. Arbogast and W. Wang, *Stability, Monotonicity, Maximum and Minimum Principles, and Implementation of the Volume Corrected Characteristic Method*, SIAM Journal on Scientific Computing 33, 2011, pp. 1549-1573.