Modeling effective transport phenomena:

Taylor Dispersion

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Abstract

When a dissolved contaminant is transported through narrow tubes, fractures, or other such conduits, it is possible for the dynamical influences of advection and diffusion to couple and generate an unexpected mode of transport for the transverse average of the contaminant. This mode of transport itself exhibits the characteristics of diffusion. However, the effective diffusion has a much faster timescale than the original diffusion.

This effective diffusion was first modeled by G.I. Taylor in 1953. Since that time, many, many others have built upon his work. However, to date, little has been said about effective transport phenomena relating to systems that have the dynamical influences of advection, diffusion, and nonlinear reaction.

In this talk, I will review one approach to understanding Taylor’s model for effective diffusion. Afterward, I will briefly describe a more flexible approach and explain why I suspect that it can be used to study reactive systems.

If you are interested in giving a talk, or want further information, please contact Jeff Adler (adler@uakron.edu, 330-972-OPRY), or visit http://www.math.uakron.edu/~adler/seminar