JOURNAL CLUB

Transport in Nature
A Fickian (diffusive) Process or Not?

by

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ABSTRACT

Turbulent transport is an important and fairly ubiquitous process in nature, relaxing gradients and moving passive and active constituent quantities in systems ranging from geophysical (oceans, atmospheres and magnetospheres) to lab (chemical, biological, fusion plasmas etc) and all the way to astrophysical (stellar, galactic and larger). We often model this turbulent transport using a parameterized diffusion equation (Ficks Law) and add ballistic flow terms to the equation to fix the inconsistencies between the observed behavior and diffusive behavior. Here we develop a technique which will allow us to self consistently model the transport based on the characteristics of the underlying transport (the turbulence etc) without the ad hoc addition of terms. The end result is a general fractional diffusion equation whose derivation and implications will be discussed.

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Globe Room, Elvey Bldg
3:45 pm