962-76-917 **Marco Latini*** (mlatini@hmc.edu), Department of Mathematics, 1250 N. Dartmouth ave., Claremont, CA 91711, and **Andrew J Bernoff** (ajb@hmc.edu), Department of Mathematics, Harvey Mudd College, 1250 N. Dartmouth ave., Claremont, CA 91711. *Transient Anomalous Diffusion in Poiseuille Flow.*

We revisit the classical problem of dispersion of a point-discharge of tracer in laminar pipe Poiseuille flow. We show that in the limit of small non-dimensional diffusion, D, that tracer dispersion can be divided into three regimes. For small times ($t \ll D^{-1/3}$), diffusion dominates advection yielding a spherically symmetric Gaussian dispersion cloud. At large times ($t \gg D^{-1}$), the flow is in the classical Taylor regime, for which the tracer is homogenized transversely across the pipe and diffuses with a Gaussian distribution longitudinally. However, in an intermediate regime ($D^{-1/3} \ll t \ll D^{-1}$), first identified by Lighthill, the longitudinal diffusion is anomalous with a width proportional to t^2 and a distinctly asymmetric longitudinal distribution. We present a new solution valid in this regime and verify our results numerically. These results suggest that anomalous diffusion is a hallmark of shear dispersion at times earlier than the Taylor regime. (Received September 29, 2000)