1092-35-27 **Alexei Novikov*** (anovikov@math.psu.edu). *Exit times of diffusions with incompressible drift.*

Consider a Brownian particle in a prescribed time-intependent incompressible flow in a bounded domain. We investigate how the strength of the flow and its geometric properties affect the expected exit time of the particle. The two main questions we analyze in this talk are as follows. 1. Incompressible flows are known to enhance mixing in many contexts, but do they also always decrease the exit time? We prove that the answer is no, unless the domain is a disk. 2. Suppose the flow is cellular with amplitude A, and the domain is of size L. What could be said about the exit time when both L and A are large? We prove that there are two characteristic regimes: a) if $L \ll A^4$, then the exit time from the entire domain is compatible with the exit time from a single flow cell, and it can be determined from the Freidlin–Wentzell theory; b) if $L \gg A^4$, then the problem 'homogenizes' and the exit time is determined by the effective diffusivity of cellular flows. (Received July 02, 2013)