

Meeting: 1001, Evanston, Illinois, SS 4A, Special Session on Fluid Dynamics, Diffusion and Reaction

1001-76-233 **Alexei Novikov*** (anovikov@math.psu.edu), Department of Mathematics, McAllister Building,
Penn State University, State College, PA 16802, and **George Papanicolaou** and **Lenya Ryzhik**.
Advection-diffusion for cellular flows at high Peclet number.

I will describe the behavior of solutions of a steady advection-diffusion problem on a bounded two-dimensional domain with prescribed Dirichlet data when Pe , the Peclet number is very large. The characteristic property of advection by cellular flows is that the fluid motion is separated into flow cells. At high Peclet numbers advection dominates diffusion and the solutions tend to constant in each flow cell. Boundary layers of order $Pe^{-1/2}$ arise near cells' separatrices. In this talk I will discuss this boundary layer structure by means of an asymptotic "diffusion on separatrices" model. (Received August 27, 2004)