1124-35-370 **Gregory J Herschlag*** (gjh@math.duke.edu), 120 Science Drive, 117 Physics Building, Campus Box 90320, Durham, NC 27708, and **Jian-Guo Liu** and **Anita T Layton**. *Fast solutions for material transport across pumping and permeable channels.*

Abstract: We examine a class of fluid flow eqautions through a channel that (i) are considered at low Reynolds number, (ii) contain permeable walls, (iii) have moving walls, and (iv) consider a dynamic model for the behavior of fluid exterior to the channel. Due to its biological relevance, there is interest to run parameter studies that determine the average flux across the permeable walls. Such a system is prohibitively expensive to study with traditional numerical methods, such as finite difference or finite volume, due to the problem class existing in a high dimensional parameter space. To alliviate this, we employ a spectral method to first solve the original partial differential equation, and then analyze this solution at the channel boundary. The result is that the partial differential equation reduces to a first order, linear, ordinary differential equation. By numerical analyzing the reduced problem, we find that there exist optimal parameter regimes that generate an average flux moving out of the channel; this result is surprising due to fact that the the fluid dynamics within the channel are time reversible. (Received September 13, 2016)