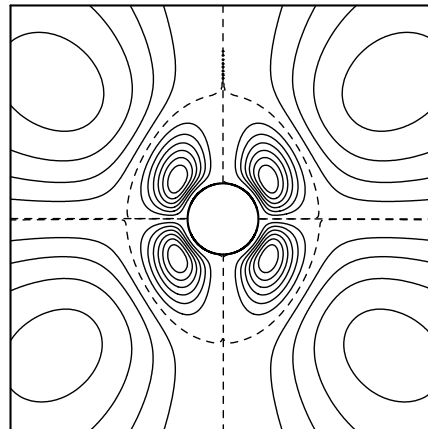
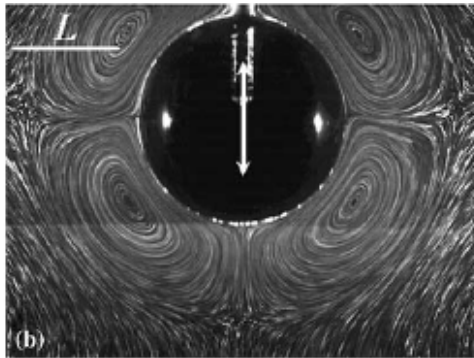


# Modeling Acoustic Streaming On A Vibrating Particle

R. S. Alassar<sup>1</sup>

## ABSTRACT

A Legendre series truncation method where the stream function and vorticity are expanded in terms of associated Legendre functions is used to calculate the secondary currents induced by a vibrating spherical particle. The time-dependent differential equations which result from the expansions are solved using a Crank-Nicolson numerical scheme. The obtained results are verified through comparisons with images from experiments. The effects of Reynolds number and the frequency of oscillations (Strouhal number) on the geometry of the streaming boundary layer are investigated and quantified. It is shown that increasing Strouhal or Reynolds number limits the width and breadth of the streaming region. A representative length is defined to characterize the extent and size of the rotating stationary vortices in the inner boundary layer.



<sup>1</sup>Department of Mathematics and Statistics  
King Fahd University of Petroleum & Minerals  
Box # 1620, Dhahran 31261, Saudi Arabia  
[aalassar@kfupm.edu.sa](mailto:aalassar@kfupm.edu.sa)