Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Motion induced between parallel plates with offset centers of radial stretching and shrinking PATRICK WEIDMAN, University of Colorado — The flow between parallel plates separated by distance h is investigated where the upper and lower plates respectively stretch and shrink at the same rate a and the centers of stretching and shrinking are horizontally separated by distance $2\,l$. A reduction of the Navier-Stokes equation yields two ordinary differential equations dependent on a Reynolds number $R = ah^2/\nu$. In addition a free parameter γ appears which corresponds to a uniform pressure gradient acting along the line connecting the stretching/shrinking centers. We consider three cases: $\gamma = 0$, $\gamma = O(1)$ and $\gamma = O(R)$. The flow is described by two functions of the plate-normal coordinate $\eta = z/h$: the first $f(\eta)$ has an analytical solution while the second $g(\eta)$ must be resolved numerically. The small-R solutions are found and the large-R asymptotic behaviors of the wall shear stresses and the centerline velocities are obtained by matching the viscous boundary layer flows to the interior inviscid motion.

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Date submitted: 30 Jul 2014 Electronic form version 1.4