1077-35-279 **Dmitry Pelinovsky*** (dmpeli@math.mcmaster.ca). *Enstrophy growth in the viscous Burgers equation.*

We study bounds on the enstrophy growth for solutions of the viscous Burgers equation on the unit circle. Using the variational formulation of Lu Lu and Doering, we prove rigorously that the maximizer of the enstrophy's rate of change is sharp in the limit of large enstrophy up to a numerical constant but does not saturate the Poincaré inequality for mean-zero 1-periodic functions. Using the dynamical system methods, we give an asymptotic representation of the maximizer in the limit of large enstrophy as a viscous shock on the background of a linear rarefractive wave. Using this asymptotic construction, we prove that the enstrophy achieve a larger growth when the initial data to the viscous Burgers equation saturates the Poincaré inequality up to a numerical constant. We construct an exact solution of the Burgers equation that describes a formation of a nearly stationary shock on the background of a linear rarefractive wave. We prove that the maximum enstrophy achieved in the time evolution is scaled as $\mathrm{E}^{3/2}$, where E is the large initial enstrophy, whereas the time needed for reaching the maximal enstrophy is scaled as $\mathrm{E}^{-1/2}$. We also give similar scaling rates for the Burgers equation on an infinite line subject to the nonzero boundary conditions. (Received August 18, 2011)