1051-76-228 **John C. Bowman*** (bowman@math.ualberta.ca), Department of Mathematical Sciences, University of Alberta, Edmonton, Alberta T6G 2G1, Canada. *Casimir Cascades in Two-Dimensional Turbulence.* Preliminary report.

It is well known that, in addition to energy and enstrophy, the nonlinearity of 2D turbulence conserves the global integral of an arbitrary C^1 function of the scalar vorticity field. However, the direction of transfer of such quantities in wavenumber space remains unclear. Numerical investigations of this problem are hampered by the fact that pseudospectral simulations, which necessarily truncate the wavenumber domain, do not conserve global integrals of arbitrary powers of the vorticity. A fundamental question is whether, in addition to the *rugged* quadratic energy and enstrophy invariants (which do survive spectral truncation), the higher order invariants also play an underlying role in the turbulent cascade.

Polyakov's minimal conformal field theory model has suggested that the higher-order Casimir invariants cascade to large scales, while Eyink suggests that they might instead cascade to small scales. We develop estimates for the degree of nonconservation of the Casimir invariants and demonstrate, using sufficiently well-resolved simulations, that the fourth power of the vorticity cascades to small scales. We also attempt to measure the decay rate of Casimir invariants in the presence of viscosity and compare to earlier work of Câteau *et al.* (Received August 25, 2009)