

Abstract Submitted  
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**Energy flow and energy dissipation in a free surface.**<sup>1</sup> WALTER GOLDBURG, MAHESH BANDI, University of Pittsburgh, JOHN CRESSMAN, Krasnow Institute, George Mason University — Turbulent flows on a free surface are strongly compressible [1] and do not conserve energy in the absence of viscosity as bulk fluids do. Despite violation of assumptions essential to Kolmogorov's theory of 1941 (K41) [2, 3], surface flows show strong agreement with Kolmogorov scaling, though intermittency is larger there. Steady state turbulence is generated in a tank of water, and the spatially averaged energy flux is measured from the four-fifth's law at each instant of time. Likewise, the energy dissipation rate as measured from velocity gradients is also a random variable in this experiment. The energy flux - dissipation rate cross-correlation is measured to be correlated in incompressible bulk flows, but strongly anti-correlated on the surface. We argue that the reason for this discrepancy between surface and bulk flows is due to compressible effects present on the surface.

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[2] U. Frisch. *Turbulence: The legacy of A. N. Kolmogorov*, Cambridge University Press, Cambridge, 1995.

[3] A. N. Kolmogorov, *Doklady Akad. Nauk SSSR*, 32, 16, 1941.

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