MEAN KINETIC ENERGY, EDDY ENERGY, AND KINETIC ENERGY EXCHANGE BETWEEN FLUCTUATIONS AND MEAN FLOW WITHIN THE GULF STREAM SYSTEM

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ABSTRACT

Ship drift data are utilized in studying the velocity field associated with the Gulf Stream System by computing three quantities suggested by the theory of turbulence: the mean kinetic energy, the eddy energy, and the energy exchange between the mean and fluctuating portions of the flow field (called dE/dt). Contours of the mean kinetic energy demonstrate that the mean velocity field is well defined and contains the major accelerations and decelerations described in the literature. Eddy energy contours show a smaller range of variance in comparison to the mean kinetic energy and a minimum situated along the center of the flow axis. The distribution of the dE/dt quantity is somewhat puzzling, although certainly contourable and non-random. It is suggested that downstream, cross-stream, and vertical components may all play important roles in its composition, whereas previous authors have made the assumption that only the cross-stream component is significant.