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**Mikhail Feldman** and **Adrian Tudorascu\***, Dept. of Mathematics, WVU, Morgantown, WV 26506. *Weak Lagrangian solutions for the Semi-Geostrophic system in physical space*. Preliminary report.

Proposed as a simplification for the Boussinesq system in a special regime, the Semi-Geostrophic (SG) system is used by meteorologists to model how fronts arise in large scale weather patterns. In spite of significant progress achieved in the analysis of the SG in dual space (i.e. the system obtained from the SG by a special change of variables), there are no existence results on the SG in physical space except in some very special cases. We shall argue that weak (Eulerian) solutions for the Semi-Geostrophic system in physical space exhibiting some mild regularity in time cannot yield point masses in the dual space. However, such solutions are physically relevant to the model. Thus, we shall discuss a natural generalization of Cullen & Feldman's weak Lagrangian solutions in the physical space to include the possibility of singular measures in dual space. We have proved existence of such solutions in the case of discrete measures in dual space. This is joint work with M. Feldman. (Received August 27, 2012)