On the probability of a displacement within an overturn The influence of structural details of the potential density profile

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ABSTRACT: The theory of probability of displacements within overturns is revisited and improved on the basis of new, topological-kinematic criteria exclusively defining what complete overturns are. On the basis of these criteria a new topological rule (RSIDI) is derived for identifying mutually exclusive sets of complete overturns and using them as independent components of the statistical analysis. Discretized models of overturns are treated as rearrangements of sequences of fluid parcels into an equal number of positions. The analysis results in the addition of new terms in the presently dominant equations. A suitable algorithm facilitates the implementation of both the new and the old probability equations for a large range of length scales. Additionally, a structural taxonomy of overturns compliant with the aforementioned criteria yields 9 types of complete overturns, for each of which the probability functions of displacements are separately estimated using combinatoric considerations. The superposition of the resulting functions of probabilities of displacements agrees well with the previously predominant theory.

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