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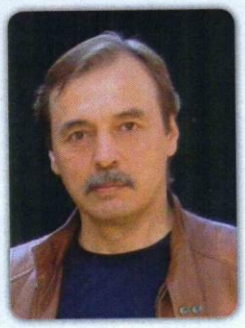

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Pair interaction of vortical structures in continuous media: Criterion of stability

Interaction of vortices is very complicated and diverse and depends on a lot of conditions, such as initial configuration of a system, parity of the sizes, degree of symmetry and vorticity of vortical formations etc., as we have shown earlier in our numerical modeling on a level with the quasi-recurrence phenomenon, at pair interaction of vortices nontrivial situations can be observed when interaction can result to formation of complex forms of vorticity regions, such as the vorticity filaments and sheets and can end to formation of complex turbulent field. Prediction of the result of interaction is an important problem in physics of fluids and plasma including applications to dynamics of vortex structures in the atmosphere, hydrosphere and a plasma, namely: evolution of the cyclonic type synoptic and ocean vortices which can be considered as a vorticity front and interactions in the vortex dust particles system and also dynamics of charged filaments which represent streams of charged particles in a uniform magnetic field. To study behavior of vortical system near critical point dividing the possible regimes of pair interaction of vortices, we introduce the criterion of stability which represents a combination of critical parameters of the interaction. Using this criterion we can give theoretical explanation of the result of pair interaction in the system of vortices including 2D and 3D vortical systems. Our approach can be effective in studying of the atmospheric and plasma vortex dynamics and useful for the interpretation of effects associated with turbulent processes in fluids and plasmas.

Biography

Vasily Yu Belashov received his PhD in Radiophysics and DSc in Physics and Mathematics. His main fields are theory and numerical simulation of the dynamics of multidimensional nonlinear waves, solitons and vortex structures in plasmas and other dispersive media. Presently, he is Chief Scientist and Professor at the Kazan Federal University. He was Coordinator of studies on the international program solar terminator during 1987-1992, and took part in the international programs WITS/WAGS and STEP. He is the author of 320 publications including seven monographs. His main books are *Solitary Waves in Dispersive Complex Media: Theory, Simulation, Applications* Springer-Verlag GmbH, 2005 and; *Solitons: Theory, Simulation, Applications*, Kazan Federal University, 2016.

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