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Study on the coherent structure of drift wave turbulence by eigenmode method

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Drift wave turbulence is one of the most important transport mechanism in magnetic confinement fusion devices. It was thought to be driven by random turbulence but if there is coherent mode in the drift wave turbulence is believed to cause strong particle flux. Is that true. In this work, mechanism of particle transport is studied using drift dynamic. It is found that the flux function is a conserved quantity for particles in drift wave pattern, and the particle trace in a certain phase space will be closed and will not generate transport. Three mechanism is proposed to break the conversation and generate particle transport that is dispersion, magnitude fluctuation and diffusion. This shows in a coherent turbulence the flux is not proportional to coherent but negative correlation to it. In this work, we use a new defined flux function in a rotation coordinate and study the particle motion and the stochastic process. Numerical simulation also shows the dispersion and amplitude perturbation is the major mechanism to produce particle transport in a drift wave pattern. This will shows a new understanding of the coherent mode transport.

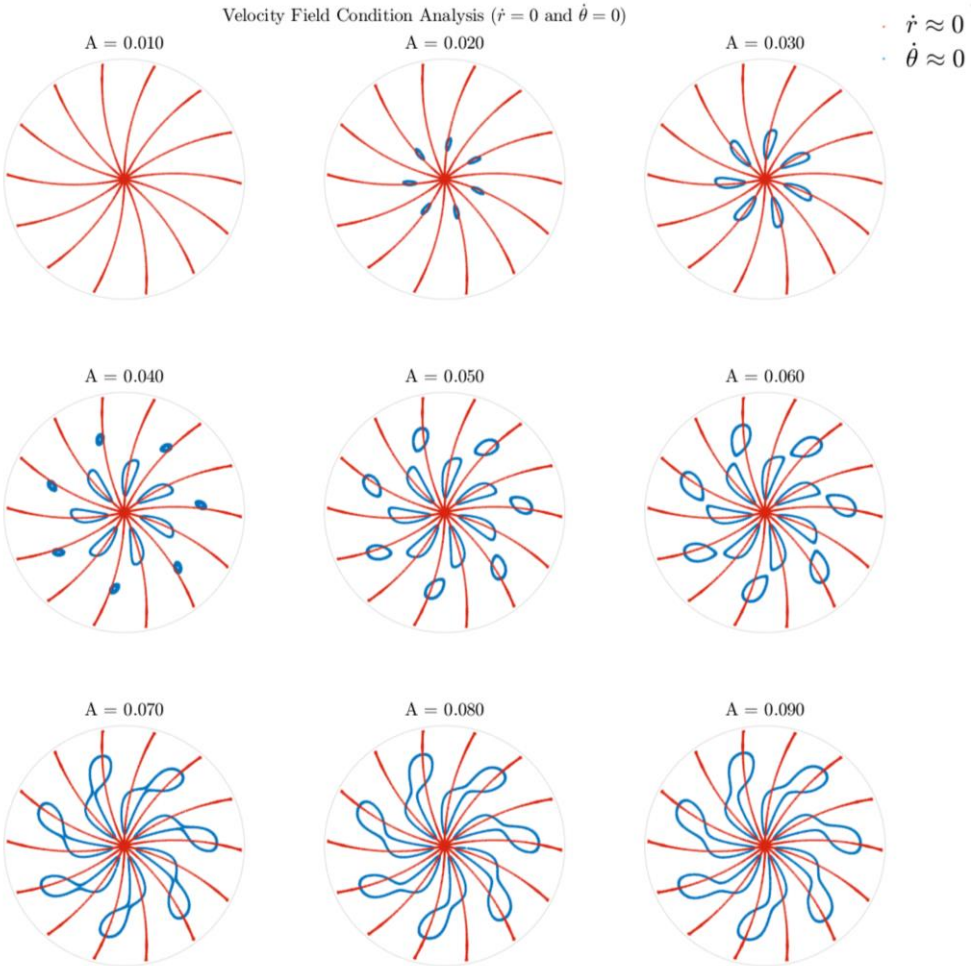

Figure1. Topology in a phase space