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Conditional nonlinear optimal perturbations of a quasigeostrophic model and its application in predictability study

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Abstract Conditional nonlinear optimal perturbations(CNOPs) of a quasigeostrophic model is obtained numerically in this paper. CNOP is the initial perturbation whose nonlinear evolution attains the maximal value of the cost function, which is constructed according to the physical problems of interests with physical constraint conditions. The difference between CNOP and linear singular vector is compared. The results demonstrate that CNOPs catch the nonlinear effects of the model on the evolutions of the initial perturbations , and is one of useful tools in the study of predictability.