Abstract View

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Radiating Barotropic Instability

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ABSTRACT

The linear stability of zonal, parallel shear flow on a beta-plane is discussed. While the localized shear region supports unstable waves, the far-field can support Rossby waves because of the ambient potential-vorticity gradient. An infinite zonal flow with a continuous cross-stream velocity gradient is approximated with segments of uniform flow, joined together by segments of uniform potential vorticity. This simplification allows an exact dispersion relation to be found. There are two classes of linearly unstable solutions. One type is trapped to the source of energy and has large growth rates. The second type is weaker instabilities which excite Rossby waves in the far-field: the influence of these weaker instabilities extends far beyond that of the most unstable waves.