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Summary: The possible existence of global modes or self-excited linear resonances in spatially developing systems is explored within the framework of the WKBJ approximation. It is shown that the existence and properties of the dominant global mode may be deduced from the variations of the local absolute frequency $\omega_0(X)$ with distance X. The main results are summarized in two theorems: (1) A system with no region of absolute instability does not sustain temporally growing global modes with an 0(1) growth rate. (2) If the singularity X, closest to the real X-axis of the complex function $\omega_0(X)$ is a saddle point, the most unstable global mode has, to leading order in the WKBJ approximation, a complex frequency $\omega_0(X_s)$. Thus, it will be temporally growing only if Im $\omega_0(X_s)$ is positive.

MSC:

76E30 Nonlinear effects in hydrodynamic stability
76E05 Parallel shear flows in hydrodynamic stability

Keywords:

Ginzburg-Landau model; existence of global modes; self-excited linear resonances; spatially developing systems; WKBJ approximation

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