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**An Asymptotic Description of Supersonic Jet Modes** LUIS PARRAS, STÉPHANE LE DIZÈS, IRPHE - Aix-Marseille University, AERODYNAMICS TEAM — We present a large-axial-wavenumber asymptotic analysis of inviscid normal modes in supersonic jets. A complete map of inviscid instabilities is obtained for different perturbation azimuthal wavenumbers. We demonstrate the existence of four kinds of modes according to their convective Mach number, defined as the ratio of their phase velocity by the speed of sound: counterflow subsonic waves, subsonic waves, radiating waves (supersonic waves) and Kelvin-Helmholtz instabilities. We provide the general conditions for each kind of this modes to exist, and by means of WKBJ analysis, the dispersion relation and an explanation for the physical mechanism of instability. Finally, we explore the limit of large Mach numbers (hypersonic flows), in which the dominant unstable modes are the radiating waves.

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