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The effect of surface tension on the absolute/convective stability of confined cylindrical jets and wakes SIMON REES, MATTHEW JUNIPER, University of Cambridge — It has been shown recently that both two-dimensional and cylindrical jets and wakes become more unstable when they are confined within a duct. This paper examines the effect of surface tension on these flows. In the two-dimensional geometry, surface tension acts in the flow direction and provides a restoring force in the cross-stream direction. In the cylindrical geometry, the azimuthal component of surface tension leads to a further force in the radial direction. For the axisymmetric (m = 0) mode, axial variations in this azimuthal component are always destabilizing and, above a threshold of surface tension, causes regions of absolute instability to extend to lower shear. For the helical (m = 1) mode, there are no axial variations in the azimuthal component and the instability is only governed by the surface tension contribution in the flow direction. For all higher order $(m \geq 2)$ modes, axial variations in the azimuthal component of surface tension are always stabilizing. Compared with unconfined flows, confinement causes the transition from convective to absolute instability to occur at lower shear and can cause surface tension to become destabilizing. This effect is examined over an infinite range of density ratios and confinement.

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