Nonlinear global modes in miscible coreannular flows BALAKR-
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ECKART MEIBURG, UCSB — We perform linear stability analyses and nonlinear
simulations of variable viscosity, miscible coreannular flows in cylindrical tubes. For
high viscosity ratios, these flows are found to be absolutely unstable, and they ex-
hibit intrinsic oscillations different from the forcing frequency. These self-sustained
oscillations give rise to nonlinear global modes. In the supercritical regime, with
the core radius being the critical parameter, the nonlinear global mode frequencies
match the linear absolute frequencies. This is in accordance with theory when the
absolute frequencies are evaluated for the parameters at the inlet. We compare our
simulations with recent experiments and observe excellent agreements.

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