Abstract Submitted
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On The Stability Of Model Flows For Chemical Vapour Deposition ROBERT MILLER, Univ of Leicester — The flow in a chemical vapour deposition (CVD) reactor is assessed. The reactor is modelled as a flow over an infinite-radius rotating disk, where the mean flow and convective instability of the disk boundary layer are measured. Temperature-dependent viscosity and enforced axial flow are used to model the steep temperature gradients present in CVD reactors and the pumping of the gas towards the disk, respectively. Increasing the temperature-dependence parameter of the fluid viscosity (ε) results in an overall narrowing of the fluid boundary layer. Increasing the axial flow strength parameter (T_s) accelerates the fluid both radially and axially, while also narrowing the thermal boundary layer. It is seen that when both effects are imposed, the effects of axial flow generally dominate those of the viscosity temperature dependence. A local stability analysis is performed and the linearized stability equations are solved using a Galerkin projection in terms of Chebyshev polynomials. The neutral stability curves are then plotted for a range of ε and T_s values. Preliminary results suggest that increasing T_s has a stabilising effect on both type I and type II stationary instabilities, while small increases in ε results in a significant reduction to the critical Reynolds number.

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