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Steady/Unsteady Solutions of Full 2-D Governing Equations of Internal Condensing Flows, Their Responses to Flow Disturbances, and Their Controllability through Exit Conditions SHANTANU KULKARNI, AMITABH NARAIN, SOUMYA MITRA, Michigan Technological University — This paper presents novel computational results obtained for the full 2-D governing equations of condensing flows in a channel (shear driven or gravity driven). It is shown that the internal condensing flows can be operated under two different boundary conditions at the exit, viz. unspecified exit condition and specified exit condition. These computational results state that for unspecified exit conditions, there exists a unique steady solution for the condensing flows, termed as "natural" solution. This "natural" solution is obtained by solving "strictly" steady governing equations. This paper demonstrates that the unsteady equations of condensing flows are *elliptic* and for the specified exit conditions different than the "natural" exit condition, one obtains an unsteady or quasi-steady solution based on the type of exit condition control. This paper demonstrates different ways to control the exit condition as well as solution attainability limits for gravity and shear driven flows.

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