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The effect of confinement length on the stability of planar dense wakes MINQIANG SI, VIKRANT GUPTA, LARRY K.B. LI, The Hong Kong University of Science and Technology — Planar dense wakes can be found in many industrial processes, such as combustion and paper-making. Confinement is known to make such wakes more locally absolutely unstable,[1] but this destabilizing effect has not been comprehensively examined in real wakes bounded by a finite streamwise domain. For example, it is not known (i) how long the confinement walls should be and (ii) what the critical values of the operating parameters should be for global instability to occur. In this experimental study, we try to answer these questions by examining a planar dense wake consisting of a central stream of CO_2 (dense gas) sandwiched by two identical outer streams of air (light gas). The wake is confined by solid walls of variable length, which act as an adjustable confinement. We find that the confinement length has a strong influence on the hydrodynamic stability of the wake: (a) self-excited global oscillations appear only when the confinement length exceeds a critical value and (b) the streamwise location of the wavemaker changes with confinement length. Knowledge of how long the confinement walls should be for global instability to occur under various conditions could be useful for optimizing industrial processes.

[1]Juniper, M.P. 2006 **J. Fluid Mech.** 565, 171–195.

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