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A test of stability rules for a series of identical canals

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Climate change and economic growth place increasing demands on the management of canal networks. The purpose of such networks may be irrigation or drainage or they may serve as routes for barges to transport goods. For efficient and effective operation purely local control is no longer sufficient. However, these systems are non-linear, flow in the separate canals is governed by a pair of nonlinear partial differential equations known as the Saint Venant equations. There are many possible approaches to the design of a computer control system for such a network. All approaches need to include a test on the stability of the system. One such test is based on a simplified system model. This test is applied to a series of identical canals to find bounds on controller parameters. These parameters are then entered into a full nonlinear computer model and sensitivity to deviations from the assumed state around which the linearization is carried out is explored.