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Thermally Modulated Flow in a Channel MATT FOTIA, JERZY M. FLORYAN, University of Western Ontario — We consider pressure driven flow in a two-dimensional channel that is subject to spatially distributed heating with the gravity field acting across the channel. The fluid is assumed to be of the Boussinesq type. In the absence of pressure gradient the convective flow field consists of rolls whose spatial distribution is determined by the form of the heating. Addition of pressure gradient forces motion of the fluid in the axial direction. At sufficiently small values of the Reynolds number the flow field consists of large separation zones maintained by the buoyancy force and a fluid stream meandering between these zones. At higher values of the Reynolds number the separation zones are swept away with the stream filling in the interior of the channel. It is shown that for certain combinations of the Reynolds and Rayleigh numbers the changes in the flow pattern lead to the reduction of axial pressure gradient required to maintain mass flow rate that is the same as in a channel without the heating. Issues related to the stability of such flow are also addressed, with specific attention focused on the formation of streamwise vortices

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