

Global-in-time existence, uniqueness and stability of solutions to a model of the Antarctic Circumpolar Current

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We consider a model for the Antarctic Circumpolar Current in rotating spherical coordinates. After establishing global-in-time existence and uniqueness of classical solutions, we turn our attention to the issue of stability of a class of steady zonal solutions (i.e., time-independent solutions that vary only with latitude). By identifying suitable conserved quantities and combining them to construct a Lyapunov function, we prove a stability result. We also show the existence of non-zonal steady solutions, by means of an application of the Crandall–Rabinowitz local bifurcation theorem.