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12180-3590. *Negative specific heat in nearly parallel vortex lines - applications to open ocean convection.*

Negative specific heat is a dramatic phenomenon where processes decrease in temperature when adding energy. It has been observed in gravo-thermal collapse of globular clusters, and we now report finding this phenomenon in bundles of nearly parallel, periodic, single-sign vortex filaments in the unbounded plane under strong confinement from preconditioned open ocean gyres. We derive the specific heat using a steepest descent method and a rigorous mean field property. Our derivations show that as temperature increases, the overall size of the system increases exponentially and the energy drops. The implication of negative specific heat is a runaway reaction, resulting in a collapsing inner core surrounded by an expanding halo of columns. (Received February 05, 2008)