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Prediction of the center temperature for compressible non-Oberbeck-Boussinesq thermal convection FRANCISCO FONTENELE ARAUJO, University of Twente, Department of Applied Physics, SIEGFRIED GROSSMANN, University of Marburg, Department of Physics, DETLEF LOHSE, University of Twente, Department of Applied Physics — Thermal convection in gaseous ethane at high pressure is theoretically analyzed, focusing on non-Oberbeck-Boussinesq (NOB) effects. On the basis of boundary-layer equations with variable transport properties, it is shown that the top-down symmetry of the velocity, temperature, and density profiles is broken. In particular, we predict that the temperature T_c in the center of the convection container is less than the mean temperature $T_m = (T_t + T_b)/2$ between the top (T_t) and bottom (T_b) plates, in contrast to the corresponding NOB effect in liquids. We also characterize the temperature profile across the top boundary-layer, as T_t approaches the gas-liquid coexistence curve and the corresponding thermal conductivity is enhanced.

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