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Temperature fluctuations in Rayleigh-Benard convection MO-HAMMAD EMRAN, JOERG SCHUMACHER, TU Ilmenau, Germany — Statistical properties of the temperature field in Rayleigh-Benard convection are studied numerically for Rayleigh numbers $Ra = 10^7, 10^8$ and 10^9 and aspect ratios $\Gamma = 1$, 3 and 5. Direct numerical simulations of the Boussinesq equations in a cylindrical configuration are therefore conducted. The statistics of the scalar dissipation rate is found to deviate from the lognormal distribution in the far tails, in contrast to recent experiments. The height dependence of the statistics of the temperature fluctuations as well as their gradients are also studied. It is found that the probability density function of the temperature field becomes increasingly symmetric towards the center. The Nusselt number and thermal boundary layer thickness as a function of the Rayleigh number agree well with other experiments and simulations in that parameter range.

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