APPLICATION OF WEIGHTED SUM OF GRAY GAS NON-GRAY MODEL TO RAYLEIGH-BENARD PROBLEM IN RADIATING FLUID

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ABSTRACT. In the present work, the Rayleigh-Benard convective instability in a radiating fluid is studied numerically. The spectral collocation method based on Chebyshev polynomials is used to solve the linear stability equations while the Radiative Transfer Equation (RTE) is solved by the finite volume based discrete ordinates method. Weighted Sum of Gray Gases model (WSGG) has been used to incorporate non-gray behavior of the gas medium and solved along with RTE. The critical values of Rayleigh number and wave number are significantly influenced by the non-gray behavior of the gas medium. Also, the mean operating temperature, mole fraction of gas species and wall emissivity play important roles with respect to the onset of fluid convection.