

COMPARISONS BETWEEN THE SRI AND NBCK METHODS IN HIGH TOTAL PRESSURE H₂O AND CO₂ MIXTURES

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ABSTRACT. The spectrally reduced integration (SRI) method is an alternative approach to obtain faster benchmark radiative transfer equation (RTE) solutions by employing coarser wavenumber discretizations on the spectral regions that are least important to the overall radiative transfer of the problem. Since the method has been just recently developed, it was only tested in atmospheric total pressure conditions. With this in mind, the present work evaluates the accuracy of the SRI method in non-homogeneous H₂O and CO₂ participating media at high total pressure conditions. Moreover, the performance of the method is compared to another common alternative to generate faster benchmark solutions, the narrow-band correlated k -distribution model. Results show that – although both methods are able to generate benchmark levels of accuracy in the several conditions considered – the SRI is able to generate less CPU intensive solutions for pressures from 30 atm to 50 atm. On the other hand, the NBCK is considerably more efficient at 1 atm. In summary, it is concluded that the SRI is a promising methodology to obtain efficient benchmark solutions at high total pressure.

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