A SIMPLE ANALYTICAL PARAMETERIZATION FOR THE WATER VAPOR MILLIMETER WAVE FOREIGN CONTINUUM

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We present a theoretical calculation of the millimeter wave foreign continuum due to colliding pairs of $H_2O - N_2$ molecules. It is based on the Lanczos algorithm, and the resulting tri-diagonal matrix is written in terms of continued fractions. The calculations are carried out in the coordinate representation in which the basis functions are delta functions whose arguments are the angular variables necessary to specify the molecular orientations. In this representation, the anisotropic interaction potential responsible for the continuum absorption is diagonal, and the ensemble averages over the states become multidimensional integrations. These are computed using the Monte Carlo method. The results, computed for a range of temperatures relevant to the atmosphere, are compared to laboratory measurements and to widely used empirical models. For easy use, we fit our results for the absorption coefficient to a simple analytic function of frequency and temperature.