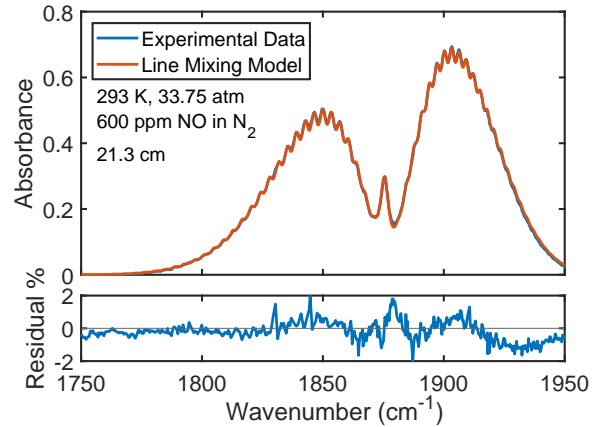


LINE MIXING STUDY ON THE NITRIC OXIDE FUNDAMENTAL BAND NEAR 5.3 MICRONS

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We present absorbance measurements of the full fundamental ro-vibrational band of nitric oxide in nitrogen bath (NO/N₂) from 1700 to 2000 cm⁻¹ at pressure and temperature conditions of 20-34 atm and 293-802 K, respectively. These measurements were taken with a narrow-linewidth, broad-scan EC-QCL laser aligned through a high-pressure, high-temperature static cell. The results were compared to a line mixing model utilizing relaxation matrix formalism and the modified exponential gap (MEG) fitting law that was previously developed using absorbance measurements limited to the R-branch^a. Improved knowledge from full-band absorbance measurements, including the P and Q-branches, indicates the need to account for inter-branch line mixing effects which were omitted in the previous model. A modified MEG line mixing model is presented with additional inter-branch coupling transfer rates and their associated scaling factors, showing stronger agreement with the measured spectra.



^aAlmodovar, C.A., "Infrared Laser Absorption Spectroscopy of Nitric Oxide for Sensing in High-Enthalpy Air," Ph.D. diss., (Stanford University, 2019)