

REAL TIME DIAGNOSTICS OF JET ENGINE EXHAUST PLUMES USING A CHIRPED QC LASER SPECTROMETER

K. G. HAY, G. DUXBURY and N. LANGFORD, *Department of Physics, SUPA, John Anderson Building, University of Strathclyde, 107 Rottenrow, Glasgow G4 0NG, Scotland, UK.*

Quantitative measurements of real-time variations of the chemical composition of a jet engine exhaust plume is demonstrated using a 4.86 μm intra-pulse quantum cascade laser spectrometer. The measurements of the gas turbine exhaust were carried out in collaboration with John Black and Mark Johnson at Rolls Royce. The recording of five sets of averaged spectra a second has allowed us to follow the build up of the combustion products within the exhaust, and to demonstrate the large variation of the integrated absorption of these absorption lines with temperature. The absorption cross sections of the lines of both carbon monoxide and water increase with temperature, whereas those of the three main absorption lines of carbon dioxide decrease. At the steady state limit the absorption lines of carbon dioxide are barely visible, and the spectrum is dominated by absorption lines of carbon monoxide and water.