Experimental sensing of CO_2 and CH_4 Gases Using the CoSM Correlation Spectroscopy Method and Comparison with Simulated Predictions from the HITRAN Database.

Ed A. D. Austin, Paul Chambers and John P. Dakin

This paper describes recent experimental results on the detection of carbon dioxide and methane gases using the complementary source modulation (CoSM) method, the topology of which is shown in figure 1, and compares these with numerical simulations from data derived from the HITRAN database. There is a particular interest in sensors using optical fibres coupled to a passively coupled sensing head. CO_2 and CH_4 have reasonably strong absorption bands in the 2.0 μm and 2.3 μm spectral regions respectively. That of methane in the 2.3 μm band is less suited for propagation over fibre lengths greater than a few metres, so the somewhat weaker absorption band at 1.6 μm is more suited to sensing over extended fibre networks. Analyses have been conducted for both of these gases and results will be presented for the prediction of modulation index, signal/noise ratio and detection sensitivity for these gases. Experimental results for these gases, using the CoSM method will be presented for the first time, and comparisons with simulations made.

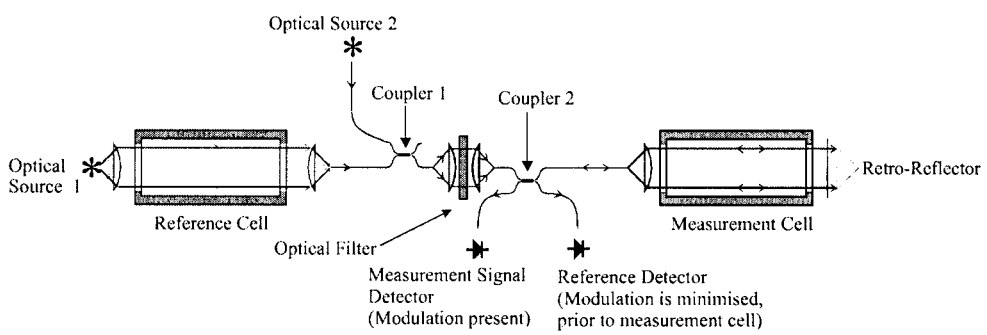

Figure 1: Schematic of a fibre compatible implementation of a CoSM correlation spectroscopy system.