

SPECTROSCOPIC MEASUREMENT IN A CO₂ PLASMA

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The aim of this project was to perform emission spectroscopic measurements in a CO₂ plasma flow. After a theoretical summary of modelling of diatomic species spectra, the experimental procedure is described: intensity and wavelength calibration and the acquisition of spectra. These spectra were acquired in the CO₂ plasma jet, both in the free stream and near the stagnation point of a cylindrical graphite sample (see picture).

Using appropriate spectral features, a Boltzmann analysis was done to evaluate the plasma temperature and assess thermal equilibration. In addition to the analysis of atomic transitions C₂ molecule were modelled using a spectral code bands developed for this application. The results of the spectral analysis for the two cases, with and without sample in the stream, were compared. For the investigate VKI-miniroch plasma, it appears that there was not significant ablation of these test sample. A second effect of the relatively low stream temperature is the low number of observed atomic lines. This limited the atomic species analysis to the use of a two atomic transitions which provide a large uncertainty on the evaluated temperature. As a consequence, no significant difference of temperature was observed between the cases with and without sample.

