

Abstract Submitted  
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**Optical measurements of gas temperatures in Ar/CO<sub>2</sub> arc plasma**  
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6606 CNRS Université d'Orléans — This paper presents an experimental study of  
the temperatures on DC vertical short free arc in Ar and Ar/CO<sub>2</sub> mixtures by em-  
ploying optical interferometry and optical emission spectroscopy. The arc plasma  
burns between two tungsten vertical electrodes with a gap of 10 mm put in a cham-  
ber filled with argon or an argon/carbon dioxide mixture at atmospheric pressure.  
Two optical windows allow to observe the arc plasma in the chamber. Electrical  
power is delivered by a DC high voltage (10 kV) with a current intensity chosen  
from 0,1A up to 0.3 A. By employing optical interferometry, acquired interfero-  
grams were treated using Fast Fourier Transform and Abel inversion to obtain the  
radial distribution of the plasma index refraction. Temperature profiles were then  
obtained from Gladstone-Dale relation, taking in account the plasma composition  
versus temperature. The experimental spectrums of the Swan band of C<sub>2</sub> molecule  
have been recorded and a code of calculation has been created to simulate molecular  
spectra of the radical C<sub>2</sub>. Finally rotational temperatures have been determined  
by comparison between experimental and calculated spectra and then temperature  
profiles have been obtained and compared with those obtained by optical interfer-  
ometry.

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