CHARACTERIZATION OF GAS TURBINE BURNER INSTABILITIES BY WAVELET ANALYSIS OF INFRARED IMAGES

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Abstract

A novel mathematical approach is tested to spatially characterize combustion fluctuations in a single burner atmospheric gas turbine test rig. The objective of the investigations was to test the optical technique during combustion tests campaign based on the analysis on fast infrared imaging of flames, coupled with photomultiplier and microphones measurements, has been elaborated on a 3 MW gas turbine test rig equipped with full scale burner tested in atmospheric conditions. The tests evidenced main oscillations at low frequencies around 82 Hz and 146 Hz. The IR technique allowed to identify the spatial distribution of these frequencies in the 2D dimensions under humming conditions. The results obtained by IR measurements and the post analysis based on wavelet analysis allowed an interesting fingerprinting of the different burner operating conditions from thermoacoustic point of view.