

Weld pool surface temperature measurement from polarization state of thermal emission

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Abstract

This paper presents a passive polarimetry method using a wavefront division optical device in order to measure the temperature distribution at the weld pool surface. We studied thermal emission from a hot liquid metal at a near-infrared wavelength corresponding to a blind spectral window of the helium plasma generated during Gas Tungsten Arc Welding (GTAW) process. The refractive index of liquid metal and the surface radiance are deduced from the state of polarization from thermal emission. Thanks to the knowledge of both characteristics, the temperature distribution can be calculated.

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