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STUDY OF THE THERMAL DIFFUSIVITY VARIATION IN THIN DUPLEX STEEL PLATES WELDED BY GTAW PROCESS

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This study describes the experimental efforts in recording 2-dimensional temperature distribution in thin plates autogenous UNS S32304 steel during welding. The butt-welded autogenous joints were experimentally performed by the GTAW (Gas Tungsten Arc Welding) process with either argon or argon-2%nitrogen atmospheres. The increase of nitrogen mass in the heat affected regions after welding was measured suggesting a correlation with the change in the thermal diffusivity of the material. The laser flash method (LFM) was also used to determine the thermal diffusivity of the material in the thickness direction. The cooling rates of the temperature cycles were recorded by thermocouples embedded by spot welding on surfaces of the plate and connected to an acquisition multichannel data system. The temperature curves suggest a relationship between the microstructures in the solidified and the heat affected zone with the diffusivity variation. These measurements define key parameters regards the residual stress study after welded process.