

# Finite volume modeling of laser assisted friction stir welding of 2017A-T451 aluminum alloy for enhanced sustainability of welded joints.

**Oussama Mimouni, Riad BADJI, Mohamed HADJI, Afia Kouadri- Henni**

**Abstract:** This study focuses on a new welding modification friction stir welding, using a preheating during the welding phase. This method utilizes laser energy to pre-heat the workpiece to a localized area at the front of the FSW tool, thereby reducing the temperature gradient over a localized area in advance of the tool. The amount of heat generated during welding determines the quality of the weld. Therefore the understanding of the temperature distribution is required to determine the optimal method of welding parameters. In this study, a two-dimensional model of an aluminum alloy plate coupled to a circular laser source is developed, using FLUENT software that is based on the finite volume method, also the geometry of the pin of the FSW tool was modified in several configurations to highlight the effect of the geometry of the tool on the temperature distribution in the welded plate. The model developed can be used to better understand the process, predict process performance and to determine the optimal parameters of the process.

**Keywords :** riction stir welding, 2017A-T451 aluminum alloy, Finite volume modeling