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Digital image correlation of resistance spot welding in press hardening steel along the automotive fabrication stages

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Resumo:

In contemporary manufacturing, resistance spot welding (RSW) plays a crucial role across industries like automotive, aerospace, and construction. This technique is extensively utilized for bonding metal components, underlining the necessity to evaluate spot welds' integrity and strength to guarantee structural robustness under varying loads. Digital Image Correlation (DIC) emerges as a destructive optical method enabling meticulous, comprehensive analysis of deformation and strain in welded joints. DIC involves processing high-resolution images captured pre- and post-loading to derive displacement and strain fields, offering valuable insights into weld quality, deformation patterns, and failure mechanisms. In this study, the influence of three welding parameters across the manufacturing process was investigated, revealing distinct performances attributable to their unique characteristics.