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Study on Residual Stress of Cylinder Generated by Quenching
Second Report Numerical Analysis Method of Stress Caused by Phase Transformation

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Summary: The authors have established an accurate good analysis technique for presuming the experimental value of the stress and the deformation caused by phase transformation through the finite element method. Because it is necessarily method to prevent from the quenching crack which is dominated by stress and deformation caused by phase transformation accompanied with the heat treatment. By using the steel transforming to fully martensite during the quenching, the experiment of heat cycle, residual stress and transformation were carried out, followed by the comparative study of the experimental and the numerical analysis value concerned with the residual stress and the deformation. Consequently the notable factors were made clear on the numerical analysis. As a result, the following conclusion was obtained. The accurate good analysis of the temperature change, the linear expansion coefficient by considering the phase transformation strain and the yield stress of each phase during quenching process are important to analyze the phase transformation stress and the deformation by the numerical analysis.

Keywords: axisymmetric cylinder quenching, phase transformation strain, residual stress, finite element method

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