



Journal of the Japan Society of  
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ONLINE ISSN : 1881-1760

PRINT ISSN : 1880-3717

**Journal of the Japan Society of Naval Architects and Ocean Engineers**

Vol. 4 (2006) pp.71-80

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## **Study on Residual Stress in Cylinders Generated by Quenching Third Report Factor of Determination and Systematic Arrangement of Residual Stress Distribution of Material where Phase Transformation is not generated.**

[Toshio Terasaki](#), [Michiaki Fukuya](#), [Hiroki Kawakami](#) and [Kouki Hasegawa](#)

(Received August 18, 2006)

**Summary:** The factor that influences the residual stress distribution generated by a quenching process was clarified and an analysis technique for estimating the residual stress distribution was established accurately even if the diameter of the cylinder is changed. First of all, a method of the numerical analysis was established through the comparative study of the experimental and the numerical analysis values of the residual stress distribution by using the steel material where the phase transformation is not generated during a quenching process. Next, using the established method of the numerical analysis, the influences of material constants and mechanical properties on the residual stress distribution were examined followed by clarifying the factor to estimate the residual stress distribution when the diameter of the cylindrical material is changed. Non-dimensional heat dissipation ' $H$ ' is important as for the factor of temperature, and each temperature dependency of linear expansion coefficient, Young's modulus and yield stress are important as for the factor of materials to analyze the residual stress distribution. It was confirmed that the residual stress distribution was able to be predicted by using Non-dimensional heat dissipation ' $H$ ' provided that the material was fixed and the diameter of cylinder was changed.

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Toshio Terasaki, Michiaki Fukuya, Hiroki Kawakami and Kouki Hasegawa: Study on Residual Stress in Cylinders Generated by Quenching : Third Report Factor of Determination and Systematic Arrangement of Residual Stress Distribution of Material where Phase Transformation is not generated. , Journal of the Japan Society of Naval Architects and Ocean Engineers, (2006), Vol. 4, pp.71-80 .

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