

Title	Mechanical properties of visco-elastic materials : for filled SBR vulcanizates
Sub Title	
Author	隆, 雅久(Takashi, Masahisa)
Publisher	慶應義塾大学藤原記念工学部
Publication year	1965
Jtitle	Proceedings of the Fujihara Memorial Faculty of Engineering Keio University (慶應義塾大学藤原記念工学部研究報告). Vol.18, No.71 (1965.) ,p.95(31)- 95(31)
JaLC DOI	
Abstract	
Notes	Summaries of Doctor and Master Theses Master of Engineering, 1965 Mechanical Engineering
Genre	Departmental Bulletin Paper
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO50001004-00180071-0031

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Mechanical Properties of Visco-Elastic Materials

—For Filled SBR Vulcanizates—

Masahisa TAKASHI*

In recent years, there has been a spectacular expansion in using polymeric materials, and it seems to be very important for engineer to analyze their mechanical properties.

The correspondence rule between elastic analysis in real time and visco-elastic analysis in Laplace transformed time has been proposed by T. Alfray and others. In this experiment, the author required to find out the relaxation modulus $E_r(t)$ in real time, using the time-temperature shift factor a_t , of filled SBR rubber, at the first stage of tensile test under various constant strain rate and temperature, and then to investigate $E(p)$ or $D(p)$ which were respectively modulus and compliance in Laplace transformed time.

From the result of this experiment, it was seen that the curve of time temperature shift factor a_t was nearly equal to the W. L. F.'s. Then $E(p)$ was numerically computed from $E_r(t)$ by collocational method and $D_c(t)$, from the inverse of $E(p)$, again.

Secondarily, the author analysed one or two examples of the cylindrical problem under internal pressure, using these moduli and compliances.

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