

タイヤトレッドゴムの氷上トライボロジー特性改善に関する研究

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Tribology of Tire Tread Rubber on Ice

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設計工学・機械要素・トライボロジー

Research Institution

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Research Abstract

It is well known that the rubber friction on ice decreases drastically at the temperature range from -10°C to 0°C. In this study, the effect of temperature on the friction for various rubber vulcanizates were investigated. The effects of sliding speed and contact pressure on the friction for rubbers on ice were also examined at -5°C.

In this study, two main investigations were carried out as follows :

(a) Frictional properties of tire tread rubber specimens, such as normal specimen (natural rubber (NR)-butadiene rubber (BR) blend), low hardness porous rubber, high hardness porous rubber and low hardness porous rubber filled with short fiber.

(b) Friction mechanism of short-fiber-reinforced-rubbers (SFRRs), which contained oriented short fibers of 3phr, 6phr, and 10phr respectively.

From above two examinations, interesting results are obtained as follows :

(1) The coefficient of friction on ice for each rubber specimen decreases drastically with increasing temperature at range from -10°C to 0°C .

At the low contact pressure of 0.2MPa, low hardness porous rubber filled with short fiber shows the highest friction coefficient among the four rubber specimens. The normal specimen (NR/BR blend) shows the lowest value and, then the two porous rubbers are medium position. At the high contact pressure of 1MPa, every specimen shows low friction coefficient and the differences of the value for each rubber specimen is not distinguishable.

(2) The friction coefficients for the normal specimen on ice at -5°C are almost constant at sliding speed range from 1 to 10cm/s. However they decrease above the speed of 20cm/s. The low-and high-hardness porous rubbers show rather higher values compared with the normal specimen. The friction coefficient for the low hardness porous rubber filled with short fiber shows higher value in the range of sliding speed examined, and drops above 30cm/s. Therefore, the filled fiber have an effect to increase the friction coefficient on ice under wide range of sliding speed.

(3) When SFRRs are rubbed against ice at -5°C, interesting results are drawn that the friction coefficients are not reduced drastically even at high speed and high contact pressure.▲ Less

Research Products (8 results)

All Other

All Publications (8 results)

[Publications] 内山吉隆: "低温におけるゴムの摩擦" 雪氷. 57. 384-389 (1995) ▼

[Publications] 内山吉隆: "総論、摩擦・摩耗-時代の要請と進歩-" 日本ゴム協会誌. 68. 578-586 (1995) ▼

[Publications] 内山吉隆 他7名: "ゴム製品の耐久性(摩擦・摩耗)の向上 ~最近の動向について~" (社)日本ゴム協会関東支部, 63 (1994) ▼

[Publications] 内山吉隆 他4名: "各種材料の摩擦・摩耗とその問題点と対策" 材料技術研究協会, 67 (1994) ▼

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[Publications] Yoshitaka UCHIYAMA: "Research Institute of Materials Technology, The Friction and Wear for Various Materials (Problems and Their Counterplan)" 67. (1994) ▼

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