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Then, in this experiment, high-amplitude vibration with low frequency (50 c/sec) was adopted. Through the experiment that the vibration was superposed on the common tensile test and Brinell hardness test, the plastic behaviors and the change of mechanical properties of the materials were investigated. The testing materials were S15C, Al and nylon.

According to the result of this experiment, the influences of the vibration are insignificant where stress amplitude $\sigma_s$ is small. But by the much more intense vibration, the tendency of softening increases rapidly. For instance, elongation increases about 10\% (S15C, $\sigma_s=20$ kg/mm$^2$) and 13\% (Al, $\sigma_s=7.5$ kg/mm$^2$) in comparison with that obtained by the common tensile test. This is mainly due to the action of heat produced by plastic hysteresis of Bauschinger's effect.

In hardness test, when the vibration is superposed, nylon shows very different behavior from that of metals.

The conclusion obtained from this experimental research is as follows:

The influence on the materials by the high-amplitude vibration is attributed to the effect of heat produced in the materials.

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**The Influence of Flexible Wall for the Transformation Phenomena from Laminar to Turburent Flow**

Tohru KIKUCHI (菊池 徹)

When the non-rigid material, namely, flexible material, is placed in the stream, between that material and flow field, it causes a physical interaction, such as, transfer of momentum and energy. Therefore, if the disturbance occurred in the flow, it would be possible that the flexible material would absorb the disturbance energy, so that the stream is stabilized and the drag due to friction is reduced. According to this idea, Krammer reported that when the material with flexible wall containing damping oil was towed by a ship, it brought remarkable drag reduction is mainly caused; (1) Laminar flow is stabilized. (2) Drag reduction in turburent flow, and (3) The effect of damping oil.

From the engineering view point, lots of studies have been made, i.e. (1) was investigated by the linealized stability theory, and (2) was also investigated experimentally, however, none of the result coincide with the Krammer's experimental result.

It this thesis, the author experimentally investigated the influence of the flexible wall using rectangular conduits and has obtained the following results:

(1) Flexible wall causes the increase in Critical Reynolds Number by 600 compared with rigid wall.
Remarkable drag reduction in turbulent flow is not seen.

It has more stabilized effect by containing damping oil.

Leakage Characteristics of Straight through Type Labyrinth Packing with Axial Motion

Saburō KITA (城多三郎)

This paper deals with theoretical analysis of the straight-through-type labyrinth packing of which throttling fins move perpendicularly to themselves.

Labyrinths with axial motion appear in the seal mechanisms of the labyrinth piston compressors, the rotating piston machineries and the rotary regenerative heat exchangers.

The leakage characteristics in “moving labyrinth packing” depend upon the normal labyrinth effect and the displacement effect which means that the fluid contained in the labyrinth pockets is carried over by the movement of the pocket itself.

The analysis was based on Harper’s method, and was extended to high velocity “moving labyrinth packing.” In such cases, the fluid velocity relative to the movement of fins must be taken into considerations. Still more, the carry-over factor, the charging coefficient and the slip factor are introduced in this analysis.

Making use of such modifications, the theoretical equations were obtained and they are calculated numerically, by using the electronic computer.

Numerically calculated results of the theoretical equations were compared with experimental results, which were already investigated sufficiently. The agreement of the theoretical and experimental results are very good if the slip factor is assumed.

Moreover, the numerical value of the slip factor was calculated by substituting the experimental results into the theoretical equation, and its best recommended value was about 0.6.

Effect of the Residual Stress on the Fatigue Crack Initiation and Propagation of Induction-hardened Steel

Hirotoshi KURIKI (栗城宏敏)

It is well known that the remarkable improvement of the fatigue strength of carbon steel, especially notched specimen, which was induction-hardened, may be