often used, and there various types of the latter isolators. So the authors picked up the typical types which are generally used, and tried to calculate and arrange the formulae to get the stresses induced in rubber parts and their spring constants.

In this study a special attention was paid to the shearing stress. Generally, the shearing stress does not distribute uniformly over the cross section, so the influence of this fact should be considered in such short machine parts as rubber vibration isolators. Then, we have to derive some correction in the calculation of shearing stress. Whenupon, putting the coefficient to correct this stress as β, the authors calculated β and found that it is the function of only the inclination of cross section of rubber for the load.

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Falling, Rolling or Sliding of Gravel in Rest Water in a Vertical or Inclined Smooth Pipe*

by Sadao KUZUHARA**

Falling, rolling or sliding motion and the descending velocity of a grain of gravel in rest water in a vertical or inclined smooth pipe were investigated.

The diameter of the grain was about 1~5 mm, and the pipe was of a transparent hard vinyl, 38.5 mm in inner diameter.

The formula which expressed the descending velocity considering the shape of the grain was theoretically established. From this formula and the experimental results, the kinetic coefficient of friction between the pipe wall and grain in the case of rolling or sliding was calculated.

The static coefficient of friction was also measured and compared with the kinetic one.

As a result, it was found that the frictional character of the pipe wall was similar to that of brass, and the sliding or rolling coefficient of friction showed respectively about one half or one third of the static coefficient.

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Studies on the Wet Vacuum Pump*

(1st Report, The Effects of Eccentricity of the Nash Type Casing)

by Osamu TORII**

In order to obtain the exact and stable characteristic curve of the wet vacuum pump, a system to control precisely the supplement of piston water is devised, and the comparative studies on the various eccentricities of the casing are performed experimentally.

The experiment reveals the following:

(1) The critical rate of supply water (q_c), required for the continuous characteristics, decreases with the increase of the speed of the runner, and with the decrease of the eccentricity of the casing.

(2) The transition point ($H_{s\max t}$, U_{at}) exists on the curve showing the relation between the tip velocity of the runner (U_a) and the maximum degree of vacuum ($H_{s\max}$) adopted under q_c, and the pump efficiency (η_{is}) becomes maximum under the velocity increased a little from U_{at}.

(3) The most effective eccentricity may be concluded as $e/r_a=0.20\sim0.22$, judging synthetically from the suction performance, efficiency, etc.

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Shock Waves in Chemically Inert Gas Mixture*

by Tetsuo FUJIMOTO**

The shock wave structure of chemically inert, binary gas mixture is studied in terms of the Mott-Smith method. The molecular velocity distribution functions of each species are assumed to be a sum of two equilibrium distribution functions which correspond to the up and down stream conditions. Four unknowns which are related to the number density are solved by using the continuity equations, 2nd order moment equations of Boltzmann equation and Rankine-Hugoniot's relation. Numerical results are obtained for Xe^{129}–Xe^{132} mixture, and for Ne–Ar mixture, ranging from Mach number 2 to 10.

The results show that almost no separation of component gases for Xe^{129}–Xe^{132} mixture. Ne–Ar mixture shows the phase shift of number density