

TABLE 1.

Material	$\frac{1}{E_0} \frac{dE}{dp}$ ( $10^6 \text{ cm}^2/\text{kg}$ )	
	According to equation (2)	Experimental data
Aluminium	7,15	7,2
Copper	2,69	4,3
Steel	2,24	2,3

Differentiating equation (1) and bearing in mind that in the range of pressures up to  $5,000 \text{ kg/cm}^2$  it is possible with sufficient accuracy for practical purposes to substitute for the real values

$$\frac{1}{E} \frac{dE}{dp}, \quad \frac{1}{G} \frac{dG}{dp},$$

$$\frac{1}{K} \frac{dK}{dp} \quad \text{and} \quad \frac{G}{K}$$

their usual values

$$\frac{1}{E_0} \frac{dE}{dp}, \quad \frac{1}{G_0} \frac{dG}{dp}$$

$$\frac{1}{K_0} \frac{dK}{dp} \quad \text{and} \quad \frac{G_0}{K_0},$$

finally for the coefficient of Young's modulus we get:

$$\frac{1}{E_0} \frac{dE}{dp} \approx \frac{1}{3 + \frac{G_0}{K_0}} \left( 3 \frac{1}{G_0} \frac{dG}{dp} + \frac{G_0}{K_0} \frac{1}{K_0} \frac{dK}{dp} \right), \quad (2)$$

where

$$\frac{1}{G_0} \frac{dG}{dp} \quad \text{and} \quad \frac{1}{K_0} \frac{dK}{dp}$$

are the coefficients of the shear and the bulk

moduli respectively.

The relationship of the bulk modulus to the pressure can be calculated using Bridgman's semi-empirical formula that applies to many solids in the range of pressures up to  $10,000 \text{ kg/cm}^2$

$$-\frac{\Delta V}{V} = ap - bp^2, \quad (3)$$

where  $a$  and  $b$  are material constants, of the orders of magnitude  $10^{-7} \text{ cm}^2/\text{kg}$  and  $10^{-12} \text{ cm}^4/\text{kg}^2$  respectively;  $p$  is the pressure (in  $\text{kg/cm}^2$ ).

From equation (3) in the zero approximation we get

$$\frac{1}{K_0} \frac{dK}{dp} \approx -a + \frac{2b}{a}. \quad (4)$$

The necessary experimental data concerning the magnitude:

$$E_0, K_0, G_0, \frac{1}{G_0} \frac{dG}{dp} \quad \text{and} \quad \frac{1}{K_0} \frac{dK}{dp}$$

for calculation according to equation (2) are given in Table 2. A comparison of the experimental values of the pressure coefficient obtained by us

$$\frac{1}{E_0} \frac{dE}{dp}$$

with the values calculated according to equation (2)

is shown in Table 2. In the table, in the experimental results obtained by us, there is a lack of agreement due to the inaccuracy of conditions. In our experiments we were not able to obtain experimental information