

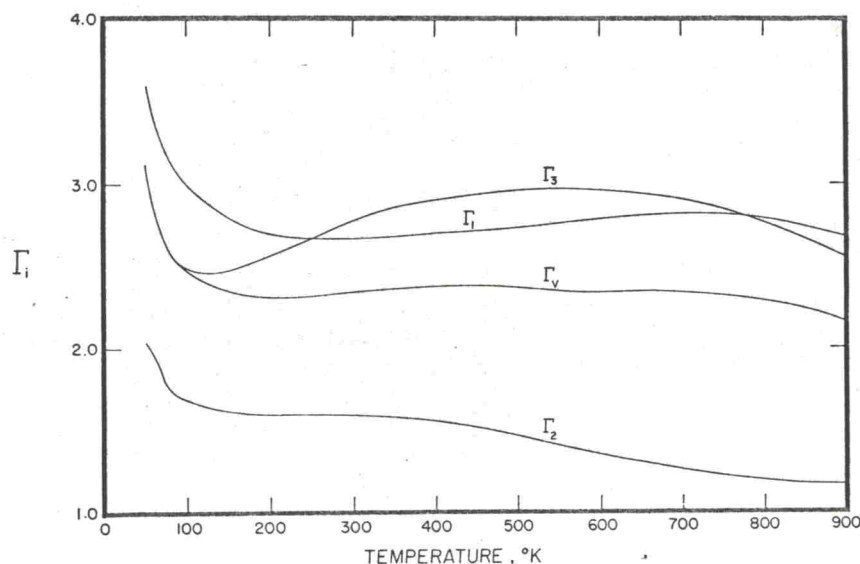


Fig. 9. The Grüneisen coefficients for principal axis strains as computed from eq. (5) of text. Γ_1 , Γ_2 and Γ_3 are the coefficients due to independent strains in the principal directions and Γ_v is that arising from volume changes.

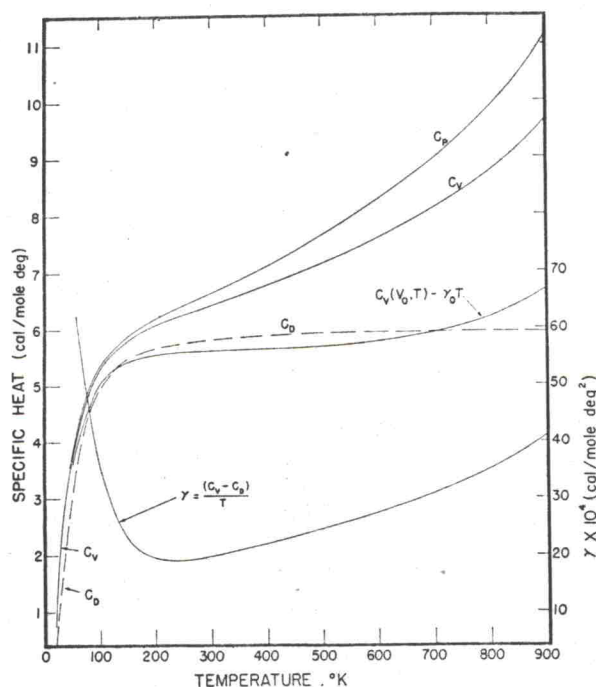


Fig. 10. Temperature dependence of C_p and C_v for uranium, from 7, 15, 16) and lattice specific heat, $C_v(V_0, T) - \gamma_0 T$, assuming a constant electronic specific heat coefficient of 26×10^{-4} cal/deg²·mole. C_D is the Debye function for a θ_D of 200° K (-----). γ curve is electronic specific heat coefficient assuming deviation from C_D originates from electronic effects.

The temperature region where the positive curvature in the $C_v(V_0, T) - \gamma_0 T$ curve begins corresponds closely to the beginning of accelerated temperature dependence of the thermal expansion coefficients and of the c_{55} elastic modulus. This coincidence suggests that the electronic specific heat coefficient does remain temperature independent, as assumed, and that an unusually large temperature dependence of the vibrational frequency spectrum exists in the 400° to 900° K range, which drastically reduced the effective Debye θ . This conclusion would be consistent with the measurements of the Debye-Waller temperature factor for neutron diffraction by Mueller *et al.*¹⁷⁾

There is, however, some evidence to suggest that the excess in C_v is due, at least partially, to a positive temperature dependence of the electronic specific heat coefficient, γ . The evidence, which is based on the temperature dependence of paramagnetic susceptibility, specific heat and electrical resistivity, has been reviewed by Friedel in terms of the band approximation to the electron energy states⁹⁾. The curve marked $\gamma = (C_v - C_D)/T$ of fig. 10 represents the temperature dependence of the