authors express the length of the wave vector to the Fermi surface by:

$$k = k_o [1 + AY_4(\theta,\phi) + A_1 Y_6(\theta,\phi)] \quad . \tag{IV-1}$$

The Kubic harmonics $Y_4(\theta,\phi)$ and $Y_6(\theta,\phi)$ are combinations of spherical harmonics having cubic symmetry; they are given by [4]

$$Y_4(\theta,\phi) = 5/2 [x^4 + y^4 + z^4 - 3/5] \tag{IV-2}$$

and

$$Y_6(\theta,\phi) = 231/2 [x^2 y^2 z^2 - Y_4(\theta,\phi)/55 - 1/105] \tag{IV-3}$$

where $x = \sin\theta \cos\phi$, $y = \sin\theta \sin\phi$ and $z = \cos\theta$. In the principal directions the values of the Kubic harmonics are:

$$Y_4(100) = 1 \qquad Y_4(110) = -1/4 \qquad Y_4(111) = -2/3$$

$$Y_6(100) = 1 \qquad Y_6(110) = -13/8 \qquad Y_6(111) = 16/9 \quad .$$

Similarly they write

$$\left(\frac{\partial k}{\partial E}\right)_{E_F} = k_o' [1 + B Y_4(\theta,\phi) + B_1 Y_6(\theta,\phi)]; \tag{IV-4}$$

the derivative is taken at the Fermi energy E_F . The scattering time is also expanded in Kubic harmonics;

$$\tau = \tau_o [1 + C Y_4(\theta,\phi) + C_1 Y_6(\theta,\phi)] \tag{IV-5}$$

The expression for n^* may be obtained from Eq. (8) of Ref. [3]:

$$n^* = 1 + 4/21 [9A^2 - 18A(C - B) - (C - B)^2] + 8/13 [20A_1^2 - 40A_1(C_1 - B_1) - (C_1 - B_1)^2] \tag{IV-6}$$

The expression is correct to second-order in the coefficients of Y_4 and Y_6 . We note that the value of n^* depends on the anisotropy of the scattering time, but not on its magnitude. As we expect, $n^* = 1$ for spherical surfaces

and isotropic scattering times. Furthermore, we see that the terms in AC and $A_1 C_1$ can give a decrease of n^* as the warping, ($|A|$ and $|A_1|$), increases, provided A, A_1, C, and C_1 have the proper sign. Once an anisotropic scattering time is introduced, increased warping of the Fermi surface does not necessarily increase n^*.

The expression of the warping in this manner has introduced two more coefficients, B and B_1, which did not appear when the energy was expanded in Kubic harmonics as in Eq. (I-4). However, B and B_1 are not independent of A and A_1. In Appendix 1 we derive the relations between B, B_1 and A, A_1 on the assumption that the warping is small.

B. Calculation of the Warping Parameters

We obtained the warping parameters A and A_1 from the computations of Ham [5] for the alkali metals. Ham's data give electron energy vs. $ka/2\pi$, where a is the lattice constant, for the 100, 110 and 111 directions. If the Fermi energy is known, we can use these curves to obtain the length of the k vector at the Fermi surface for the three principal directions. Equation (IV-1) can then be used to obtain three equations, from which k_o, A and A_1 can be computed.

The Fermi level can be obtained by a simple procedure. The Fermi surface must enclose a volume in k space which contains all the electronic states of the valence electrons. The density of states in k space per unit volume of crystal is $1/4\pi^3$ and a b.c.c. crystal with lattice constant a and one valence electron/atom has $2/a^3$ valence electrons/unit volume. For a spherical Fermi surface the radius, k_s, is given by

$$\frac{1}{4\pi^3} \; k_s^3 \; 4\pi/3 = 2/a^3 \qquad \text{(IV-7)}$$

or

$$a k_s/2\pi = .62 \qquad \text{(IV-8)}$$