$$\overline{\alpha} = \frac{1}{2}\alpha_\ell\left(p^6 + q^6\right) + \alpha_u p^3 q^3 \tag{18}$$

$$\overline{B} = \frac{1}{2}B_\ell\left(p^8 + q^8\right) + \frac{1}{2}B_u p^3 q^3\left(p^2 + q^2\right) \ , \tag{19}$$

where $p^3 = 1 + I$ and $q^3 = 1 - I$. (See Fig. 4.) Thus the dependence of the energy on density is in all cases the same type of quintic and the equilibrium condition always reduced to a readily solvable cubic. It follows that the equilibrium density, binding, as well as the compressibility coefficient K(I) can be written down algebraically for any value of the relative neutron excess I.

9. Finite nuclei

Figure 5 shows the charge densities for ^{56}Fe, ^{124}Sn and ^{209}Bi, as obtained by numerically solving the Euler-Lagrange equations (8). The densities shown were obtained by folding into the calculated point densities a Yukawa proton form factor with an RMS size of 0.85 fm. The resulting values of $\langle r^2\rangle^{1/2}$ for the three charge distributions are 3.69, 4.64, 5.51 fm, to be compared with 3.80, 4.69, 5.51 fm, or 3.73, 4.67, 5.52 fm, as deduced from [24] using a Woods-Saxon or a three-parameter Gaussian fit to electron scattering data, respectively.

10. Semi-infinite nuclear matter

By solving the Euler-Lagrange equations in the limit of semi-infinite geometry ([19], [20]) one can study the surface properties of nuclear matter. Figure 6 (based on the 1990 version of our model [20]) shows a remarkable feature of such calculations: if the surface width (diffuseness) is held fixed, the surface energy is virtually a perfectly linear function of the compressibility K. Our current model with $b_0 = 1.0$ fm gives for the width b (after folding in the nucleon size) the value $b = \sqrt{b_0^2 + (0.85)^2/3} = 1.11$ fm. Thus the current surface energy $a_2 = 18.5$ MeV and compressibility K = 234 MeV are in line with the 1990 systematics of Fig. 6.

11. Fitting ground state masses

We write the mass excess of a nucleus as [25]