

Errata

Erratum: Thomas-Fermi-Dirac statistical theory of dispersive dielectric screening in undoped semiconductors at zero temperature [Phys. Rev. B 29, 3259 (1984)]

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The nonlinear Thomas-Fermi-Dirac (TFD) results in Sec. V, for the negative-ion case, require revision. Equations (22) and (23) should read

$$\nabla^2 V(r) = (2^{7/2}/3\pi)[\gamma + (\gamma^2 + E_F)^{1/2}]^3, \tag{22}$$

$$V(r) = \frac{-Z}{r} + (2^{5/2}/9\pi)[\gamma + (\gamma^2 + E_F)^{1/2}]^3 r^2 + \beta. \tag{23}$$

As a result of these corrections, Table IV and Figs. 3 and 5 are modified. The qualitative conclusions concerning Fig. 3 remain unchanged. Figure 5 now consistently shows that nonlinear TFD screening more effectively reduces repulsive potentials than does nonlinear TF screening. It is concluded that nonlinearity and exchange tend to make the screening more effective for attractive *and* repulsive potentials than the former acting alone.

TABLE IV. Listing of screening radii and Coulomb-hole radii for nonlinear TFD screening equation for diamond, Si, and Ge when $Z = \pm 1, \pm 2, \pm 3,$ and ± 4 . TF values of Ref. 3 are in parentheses, and $Z = 0$ corresponds to the linear results of Table I.

	Z	Diamond	Silicon	Germanium
Screening radius R (a.u.)	4	2.18(2.44)	3.11(3.74)	3.37(4.02)
	3	2.22	3.17	3.43
	2	2.27	3.24	3.50
	1	2.34(2.64)	3.34(4.06)	3.60(4.33)
	0	2.44(2.76)	3.50(4.28)	3.74(4.54)
	-1	2.63(2.93)	3.91(4.63)	4.14(4.86)
	-2	2.79	4.21	4.43
	-3	2.92	4.44	4.65
	-4	3.04(3.30)	4.64(5.28)	4.85(5.47)
Coulomb-hole radius R_c (a.u.)	-1	0.67(0.53)	1.30(0.97)	1.26(0.93)
	-2	0.98	1.81	1.76
	-3	1.21	2.17	2.10
	-4	1.40(2.21)	2.45(2.06)	2.39(1.98)

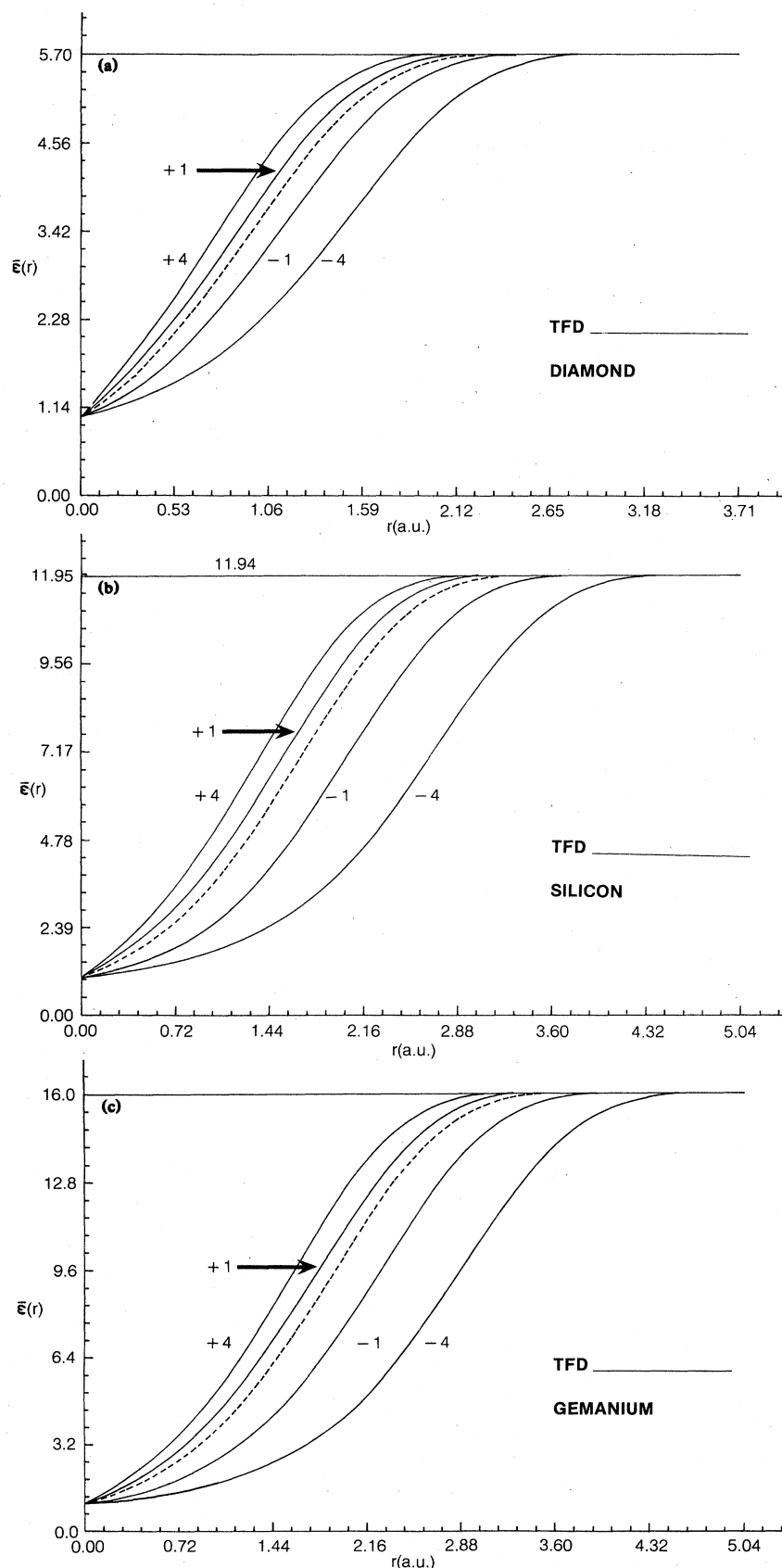


FIG. 3. TFD spatial dielectric functions for diamond, silicon, and germanium in the nonlinear regime when $Z = \pm 1$ and $+ - 4$. The dotted line denotes the Z -independent linear regime.

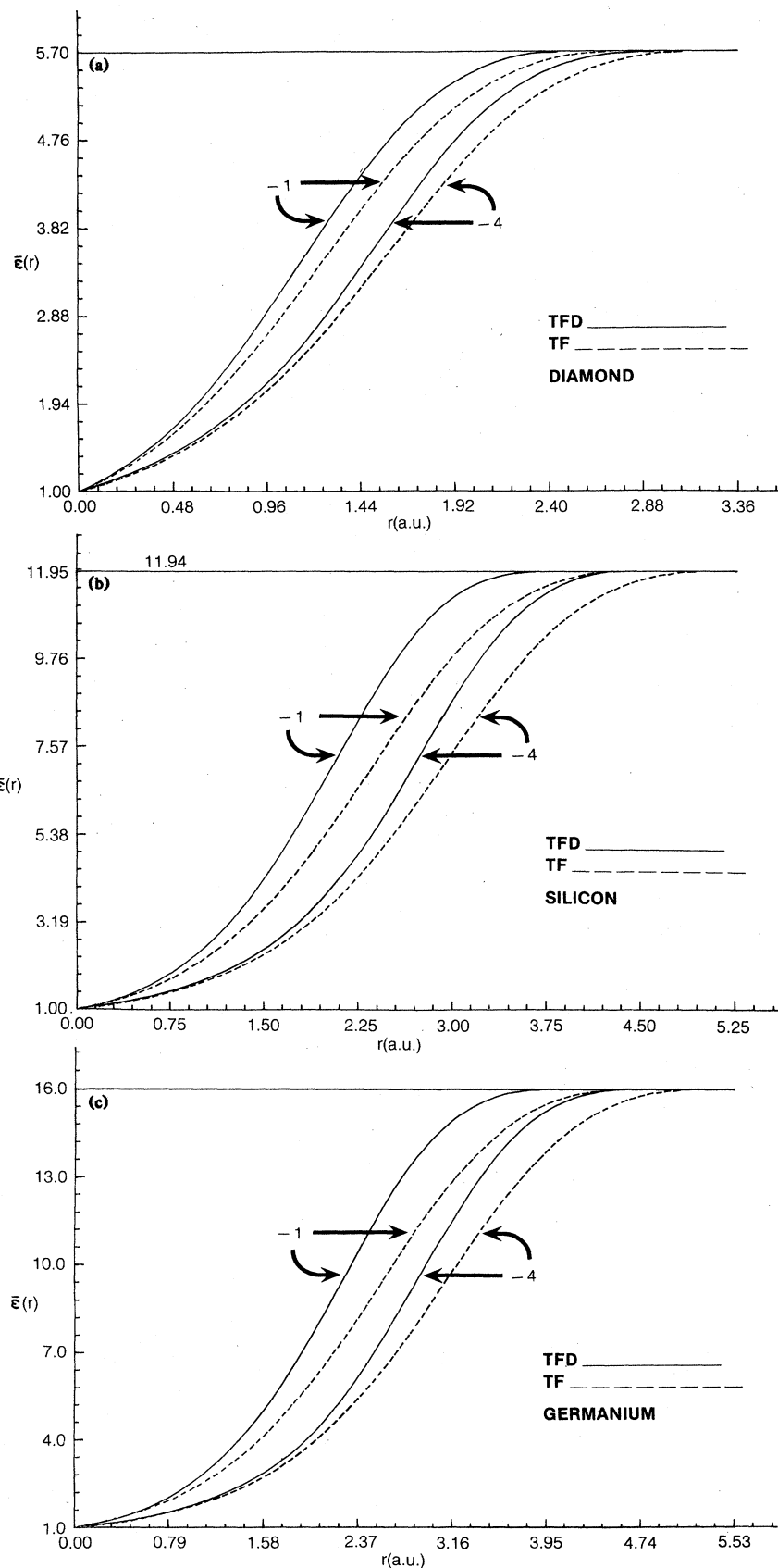


FIG. 5. Comparison of the TF and TFD spatial dielectric functions in the nonlinear regime for diamond, silicon, and germanium when $Z = -1$ and -4 .