Phase singularities in isotropic random waves

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Corrigendum 1. Equation (4.48) and the material to the end of § 3 should be replaced by

$$\langle Q^2(N)\rangle = \tfrac{1}{2}N\left(1 + 2\pi d_2 \int_0^\infty \mathrm{d}R\, R g_Q(R) \exp\left\{-\frac{\pi R^2}{2A}\right\}\right)$$
$$= \frac{1}{4}\int_0^\infty \mathrm{d}R\, R \frac{C'(R)^2}{(1 - C(R)^2)} \exp\left(-\frac{\pi R^2}{2A}\right), \qquad (4.48)$$

where in deriving the second equality we have used equation (4.47) and the critical-point screening relation (2.24) that follows from it. The first equality shows that without critical-point screening, the leading term for large N would be $\frac{1}{2}N$, and the fluctuations would be those of a random distribution with overall neutrality. But for dislocations there is screening, and

$$\langle Q^2(N)\rangle = \frac{1}{4}\int_0^\infty \mathrm{d}R\, R \left[\frac{C'(R)^2}{1 - C^2(R)}\right] + O(N^{-1}), \qquad (4.49)$$

provided the integral converges, leaving fluctuations that are *independent of* N for large N. However, for the sharp spectra representing monochromatic waves in space ((3.17) and (5.6) later), and in the plane ((3.18) and (5.9) later), the integral does not converge. Then we can show from (4.48) that $\langle Q^2(N)\rangle \sim \log N$ for waves in space, and $\langle Q^2(N)\rangle \sim \sqrt{N}$ for waves in the plane.

Corrigendum 2. Equation (6.8) should be replaced by

$$C(R) = \frac{30}{\pi^4}\sum_{n=1}^{\infty} \frac{3n^2 - (k_T R)^2}{[n^2 + (k_T R)^2]^3}$$
$$= \frac{15}{(\pi k_T R)^4}\left[1 - (\pi k_T R)^3 \frac{\cosh(\pi k_T R)}{\sinh^3(\pi k_T R)}\right]. \qquad (6.8)$$