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Coulombic Energies of Polygonal Charge Distributions

Content :

Explicit expressions for Coulombic energies of assemblies composed of N unit charges occupying vertices of regular polygons are obtained. The self-energy of such a ring of charges is given in terms of an asymptotic series that, when replaced by an equivalent Pade approximant, yields highly accurate energy values for any N . The energy of Coulombic interactions of two rings of charges is readily computed in terms of the Fourier series with respect to the angle that measures the relative rotation of the polygons in question. The series, which contains only the cosine function, can be resummed, yielding a definite integral amenable to both analytical work and numerical quadrature.

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