Static Polarizabilities of Nanoclusters HYE-YOUNG KIM, JORGE
SOFO, Physics Department, The Pennsylvania State University, University Park,
PA, DARRELL VELEGOL, Chemical Engineering Department, The Pennsylvania State University, University Park, PA, MILTON COLE, Physics Department,
The Pennsylvania State University, University Park, PA, GAUTAM MUKHOPADHYAY, Physics Department, Indian Institute of Technology-Bombay, India — In the
present work, we evaluate the static polarizability of a cluster using a microscopic
method that is exact within the linear and dipolar approximations. Numerical examples are presented for various shapes and sizes of clusters composed of identical
atoms, where the term "atom" actually refers to a generic constituent, which could
be any polarizable entity. The results for the clusters' polarizabilities are compared
with those obtained by assuming simple additivity of the constituents' atomic polarizabilities; in many cases, the difference is large, demonstrating the inadequacy
of the additivity approximation. Comparison is made (for symmetrical geometries)
with results obtained from continuum models of the polarizability. Also, the surface
effects due to the nonuniform local field near a surface or edge are shown to be
significant.

Hye-Young Kim
Physics Department, The Pennsylvania State University, University Park, PA