COUPLING OF SURFACE AND VOLUME DIPOLE OSCILLATIONS IN C_{60} MOLECULES

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Abstract: We first present the main ideas of the "local-current approximation" (LCA) which is a theoretical tool that utilizes a general variation principle for the description of strongly collective excitations in finite fermion systems. This approach has previously been successfully applied to the calculation of coupled translational and compressional collective dipole modes in metal clusters. Here we discuss collective electronic dipole excitations in C_{60} molecules (Buckminster fullerenes). It is shown that the coupling of the pure translational mode ("surface plasmon") with compressional volume modes in the semiclasscial LCA yields surprisingly close agreement with time-dependent density functional (TDLDA) calculations for the collective modes. Both theories yield qualitative agreement with recent experimental results.