Theory of the Jahn-Teller Soliton DENNIS CLOUGHERTY, University of Vermont — It is demonstrated that under common conditions a molecular solid subject to Jahn-Teller interactions supports stable Q- ball-like non-topological solitons. Such solitons represent a localized lump of excess electric charge in periodic motion accompanied by a time-dependent shape distortion of a set of adjacent molecules. The motion of the distortion can correspond to a true rotation or to a pseudo-rotation about the symmetric shape configuration. These solitons are stable for Jahn-Teller coupling strengths below a critical value; however, as the Jahn- Teller coupling approaches this critical value, the size of the soliton diverges signaling an incipient structural phase transition. The soliton phase mimics features commonly attributed to phase separation in complex solids.

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