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**Mark S Herman\*** ([herman@math.rochester.edu](mailto:herman@math.rochester.edu)), UR Mathematics, University of Rochester, RC Box 270138, Rochester, NY 14627. *A Born-Oppenheimer Expansion Near a Renner-Teller Type Intersection.*

It is known that the usual Born-Oppenheimer approximation can break down near nuclear configurations at which electronic energy levels intersect. This occurs at most of the electronic states at the linear configuration of molecules due to symmetry required degeneracies in the electronic states. Also from symmetry, these intersections are non-generic in the sense that the first derivatives of the energy levels with respect to the bending coordinate vanish at the intersection. This is called the Renner-Teller effect. We discuss the bending modes of a linear triatomic molecule that exhibits the Renner-Teller effect, in a case that admits bound states. Assuming the potentials are smooth, we show that the wave functions and energy levels have asymptotic expansions in powers of  $\epsilon$ , where  $\epsilon^4$  is the ratio of the electron mass to the mass of a nucleus. Various properties of the leading order equations and their solutions will be discussed. (Received January 25, 2010)