CAN RESONANCES OCCUR IN THE PHOTODISSOCIATION CONTINUUM OF A DIATOMIC MOLECULE?: THE ROLE OF POTENTIAL DISCONTINUITIES

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Continuum resonances are standard fare in the instructional literature for quantum mechanics, where they arise from the continuity conditions imposed on one-dimensional wavefunctions for piecewise-constant potential energy functions. Such resonance structure weakens progressively as the discontinuity in the potential is smoothed, showing that the structure is specifically attributable to the discontinuity. Since diatomic molecular potential energy curves seldom vary rapidly on the distance scale of the period of the wavefunction, such continuum resonances are not expected in absorption continua. A historically interesting prediction of such structure in the Schumann-Runge continuum ($B \leftarrow X$) of O_2 is attributed to the inadvertent incorporation of discontinuity in the B-state potential curve employed in the computations.