The Generalized Landau-Zener Vibronic Model

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Abstract: I Will begin with a brief introduction to higher-order differential equations in physics, highlighting the key challenges they present. The discussion then focuses on a generalized one-dimensional two-level vibronic model, which extends the well-known linear Landau-Zener model. Upon decoupling the system's components, the resulting fourth-order differential equation is shown to possess a hidden sl(2) algebraic structure. This allows the so-called exceptional part of the spectrum to be expressed in a remarkably simple form. Connections to the quantum Rabi model and its generalizations are also discussed, along with ideas for possible experimental realizations.

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