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Numerical Analyses of the Landau-Zener Transition with a Finite Sweeping Time[1] BLAZ SERNA, Cal State Univ- Long Beach, LIN TIAN, Associate Professor at UC Merced — We present detailed numerical analyses of the Landau-Zener Transition in a quantum two-level system with finite sweeping time. Our goal is to obtain accurate description of the Landau-Zener Transition, as well as an analyzation at or near the gap ($t = 0$). We study the transition probability for the case of a symmetric crossing, where $t_i < 0$, $t_f > 0$ and $|t_i| = t_f$, and the crossing occuring at $t = 0$, as well as the half crossing, which requires two simulations with the time-spans being from $-200 \leq t \leq 0$ and $0 \leq t \leq 200$. Furthermore, we numerically simulated the Landau-Zener Transition for an adiabatic process, and a non-adiabatic process for both the symmetric and half crossing. Lastly, we will compare our numerical results with the analytical results presented by N.V. Vitanov and B.M. Garraway. The Landau-Zener Transition exhibits very little or no transition probability for both the excited and ground state in an adiabatic process. Yet, for a system in a non-adiabatic process, the Landau-Zener Transition probability increases for the excited state as we increase the velocity at which our two-level quantum system changes. As a result, the transition probability for the excited state approaches 1 for the symmetric crossing, and 1/2 for half crossing.

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