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Shaped-Pulse Control of CO_2 Bending Vibration[1] G.Y. CHEN, Z. WANG, G. MINKER, S. IACANGELO[2], W.T. HILL, III, University of Maryland — Pulse shaping combined with genetic feedback learning algorithms have proven to be a useful approach for controlling dynamics and producing specific products in a molecular system. However, since the optimal waveforms tend to be neither simple nor unique, extracting the physics – e.g., identifying the internal quantum trajectories taken by the system to the desired solution – is a daunting if not impossible task. We are making steps towards addressing this problem by focusing on isolatable parameters related to eigenmodes of three-atom systems. Specifically we have exploited Coulomb explosion imaging with shaped pulses to modify the bending, ν_2, amplitude of CO_2 by more than 30% relative to the transform limited pulses. The optimal shapes were determined via genetic algorithm were the 2^{nd} through 5^{th} order phase components were the "genes." While the temporal shapes are different for different solutions, the temporal phases can be remarkably similar for some classes of solutions, which is providing insight into the physics. These results, along with our interpretation will be discussed.

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