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AM and FM in Molecular High-order Harmonic Generation XUE-BIN BIAN, Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences, ANDRE BANDRAUK, Universite de Sherbrooke — We theoretically studied the MHOHG from one-electron diatomic molecular ions in intense laser fields in a non-BO treatment to measure the influence of nuclear motion. Not only amplitude modulation (AM) [1-2], but also frequency modulation (FM) [3] encodes rich information of electron-nuclear correlation. It is found that the dissociation of molecules will lead to obvious redshifts in FM with intercycle dynamics in harmonic spectra. Usually the ionization rate of stable molecules at the equilibrium distance Re is very low. When the nuclear distance is bigger than Re, the ionization rate of the system increases rapidly. Consequently, most of the harmonic generation occurs on the falling part of laser pulses, where dI/dt <0, leading to redshifts in MHOHG. This mechanism is confirmed by studying the isotope effect. The mechanism of FM in MHOHG is general, which can be directly applied to other light molecules if the ionization rate is sensitive to nuclear motion. It is hoped that this theoretical work will stimulate experimental studies in FM.

[1] M. Lein, Phys. Rev. Lett. 94, 053004 (2005).
[2] S. Baker, et al., Science 312, 424 (2006).
[3] X.-B. Bian and A. D. Bandrauk, Phys. Rev. Lett. 113, 193901 (2014).

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