5. Summary

By performing a high-resolution correlation experiment using a two-color synthesized laser field consisting of the fundamental field of a terawatt 15-fs laser system and its SH field, we have been able to observe delay-dependent periodical frequency modulation of HH fields, for the first time. The amplitude of the frequency modulation depends on the intensity and chirp of the fundamental field as demonstrated by the experimental results. The numerical analysis revealed the crucial role of the anharmonic frequency components of the SH field in this phenomenon and the obtained results with SH wavelength of 417 nm highly approve of the experimental results and show that a fundamental field with a slight amount of minus chirp and a higher intensity can result in a larger amplitude of frequency modulation. Also, the frequency modulation amplitude has been estimated by considering the frequency difference of even-order harmonic fields generated by two in-situ processes when the SH field has anharmonic frequency components and the HH fields are blue shifted due to the high intensity of the fundamental field. The estimated amplitude agrees with the experimentally observed one. This novel phenomenon could be applied in in-situ precise control of the intensity and pulse duration of attosecond pulse trains.

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