Laser Physics 2015 vol.25 N7

Nonresonant double-pulse selective spectroscopy of interaction-induced response in liquids through an optically-heterodyne-detected optical-Kerr-effect

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Abstract

© 2015 Astro Ltd. We propose and analyze theoretically the implementation of two pump pulses with orthogonal linear polarization for the separate measurement of an interaction induced response in liquids through the optically-heterodyne-detected optical-Kerr-effect. The key parameters controlling the specificity of the double-pulse excitation scenarios are the pulse duration, the delay between pulses and the relation between the pump pulses amplitudes. We use acetonitrile as an example to model the fifth-order optical response and consider some principles of the scenarios construction. We show that it is possible to adjust the excitation scenario in such a way that the intramolecular and orientational responses are removed from the detected signal. The theoretical analysis reveals that the double-pulse excitation technique can be useful for the selective spectroscopy of the interaction induced responses of the molecules in liquid.

http://dx.doi.org/10.1088/1054-660X/25/7/075701

Keywords

coherent control, multiple-pulse selective spectroscopy, ultrafast optical Kerr effect