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Short Communication

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Research of the pico-second CO2 laser amplifier based on sequence band gain spectrum

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Abstract:

When the ultra-short laser pulse is used for the plasma acceleration, the energy transferring to the charged particle is proportional to the product of the field intensity and the square of the wavelength. Due to its mid-infrared wave band(10.6μm), CO2 laser is likely to be one of the most important next generation light source for the laser acceleration of proton and ion. However, due to the discretization and narrow bandwidth of the gain spectrum of CO2 molecules, it is hard for the chirped pulse amplifi cation being used for the CO2 laser. Th is project proposes to increase the gain of CO2 molecules sequence band using optical pumping and compact the gain spectrum by means of overlapping gain spectrum of sequence band and normal band to solve the problem, realizing pico-second CO2 pulse amplifi cation at quasi-continuous spectrum. The team will carry out the researches about the absorption spectrum of sequence band, the energy relaxation at each rotational level of the optical pumped sequence band, the coherent amplifi cation process of diff erent spectrum of the input pulse in the different gain band series both theoretically and experimentally. Establishing a synthesis analytical model of a quasi-continuous spectrum CO2 laser amplifi cation matching electro-optic pump, roundly analyzing infl uence of gain of CO2 sequence band on performance characteristics of the amplifi er, building pulse discharge CO2 laser amplifi er with innovative structure and high effi ciency pumped by solid-state laser, obtaining laser output at ps-mJ level, Laying the theoretically and experimentally foundation for picosecond-Terawatts CO2 laser system.

Biography:

Tang Xiahui is a professor and doctoral supervisor of School of Optical and Electronic Information at Huazhong University of Science and Technology. He is presently the vice-director of the National Engineering Research Center for Laser Processing and he is the executive member of the council of Hubei mechanical engineering society and laser processing committee of the Chinese Optical Society, the vice-chairman of Laser Institute of Hubei Province, the editor of "Laser Technology" and "Applied Laser". His interested areas are high power CO2 gas Laser, high power laser processing systems integration, welding, brazing, cutting and surface engineering. He published more than 60 papers in the domestic and foreign academic journals, more than 20 papers were SCI, EI, ISTP included and Obtained 5 Chinese invention patents. He received Hubei Science and Technology Progress Award in 2004 and Ministry of Education, National Science and Technology Progress Award nominations in 2005. He has fi nished the MOST National "Fifteen" Scientifi c Technological Research Plan, "Eleventh Five" major scientifi c and technological support plan, Doctoral Fund of Ministry of Education, Hubei Province "Eleventh Five-Year" key scientifi c and technological and NSFC, respectively. Further, he undertook nearly 60 enterprises of science and technology projects.