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Thermo-mechanical effects in laser-matter interactions

The laser-matter interactions involve the transfer and transition among different energy forms, which are designated to realize specific technology termination. For instance, the light-electricity effect is adopted to get electricity energy from light energy in the technology concept of laser power beaming. The light-thermal effect is utilized to heat the material, intrigue phase change in the technology of additive manufacture as well as subtraction manufacture. In these fields, much or almost all of the absorbed light energy would dissipate immediately into heat in a medium irradiated by laser, which would develop obvious mechanical responses of thermal expansion, displacement, strain and thermal stress. The energy efficiency and even the feasibility of the laser technology are ultimately determined by the competitions between different energy forms as well as between thermal energy concentration and heat diffusivity, which is largely represented by the aforementioned thermo-mechanical effects. Accurate descriptions on thermo-mechanical effects are of crucial importance for the evaluation, optimization and innovational development of the widespread laser technologies. This lecture will cover the basic concepts of the physical mechanism as well as its mathematical modeling on laser-matter interactions. The main knowledges obtained by our own group as well as worldwide colleagues will be sketched and, the open issues as well as tendency will be discussed.

Biography

Chen-Wu W U has completed his PhD in the year 2007 from Chinese Academy of Sciences. He is an Associate Professor and Senior Scientist in Chinese Academy of Sciences. He works on Laser-Matter Interactions as principal investigator for research projects supported by Knowledge Innovation Project of Chinese Academy of Sciences, National Natural Science Foundation of China and National High-tech R&D Program of China etc. He has been approved more than 10 invention patents, been invited to present at more than 20 academic conferences and has published more than 30 papers in reputed journals.

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