

On the effects of multi-pump Raman amplification of short laser pulses

K. V. Lezhnin, K. Qu, N. J. Fisch

Department of Astrophysical Sciences, Princeton University, Princeton, USA

Beam combining is a promising concept for amplification of laser beam via crossing it with multiple pump beams. The ongoing experimental campaign at National Ignition Facility demonstrated the feasibility of generating a high power beam by crossing a seed beam with multiple identical pump beams, with the energy transfer mechanism being Brillouin scattering. Using coupled nonlinear Schrodinger equation model and 2D particle-in-cell simulations, we investigate the effects of resonant pulse amplification by pump energy redistributed between multiple pump beams, paying special attention to questions of energy transfer and focusability of the amplified seed. We show that the redistribution of the pump energy between multiple pumps and their optimal arrangement may help to improve seed energy gain and its focusability.