

This work is dedicated to the generation and characterization of beams of harmonic frequencies of the Perla C-100 laser. In the theoretical part, coupled wave equations are derived with application to the generation of second harmonic and sum frequency, and a comparison of other systems for the generation of harmonic frequencies is made. The second part is dedicated to the design of the system for the generation of harmonic frequencies, the choice of suitable nonlinear crystals, and numerical simulations are used to determine the ideal parameters of the given crystals. The experimental part describes the set-up for the generation of harmonic frequencies, characterizes the important beam parameters, namely powers, pulse lengths, pulse spectra, M^2 parameters and beam profiles, and addresses the effect of changing the repetition frequency of laser pulses on the generation of harmonic frequencies.