The Computer Generation of Holographic Optical Tweezers

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Dickinson College — Due to their ability to apply forces on a small scale, optical
tweezers are useful for a variety of biological and physical applications. The utility
of optical tweezers can be extended by producing multiple traps with different char-
acteristics from a single beam. One method for achieving this is to manipulate the
phase of a trapping laser’s wave front with a computer generated kinoform displayed
on a spatial light modulator. We compare the performance of two algorithms for
kinoform calculation, a Gerchberg-Saxton algorithm and a direct search algorithm,
and discuss how they address problems inherent to computer generated holographic
optical tweezing.