

Navigating accelerating beams along arbitrary trajectories

Nikos Efremidis (University of Crete, Greece)

D. N. Christodoulides (CREOL, University of Central Florida, U. S. A.)

Zhigang Chen (San Francisco State University and Nankai University)

Self-accelerating beams have stimulated growing research interest since the concept of Airy wave packets was introduced from quantum mechanics into optics. As exact solutions of the paraxial wave equation (which is equivalent to the Schrödinger equation), Airy beams propagate along parabolic trajectories and are endowed with useful properties such as self-accelerating and self-healing, promising for many applications such as guiding micro-particles, producing curved plasma channels, and dynamically routing surface plasmon polaritons. In this talk, we will provide a brief overview of our work on optimal control of linear and nonlinear self-accelerating beams, including generation and application of optical bottle beams and auto-focusing beams, self-accelerating Bessel-like and vortex beams along arbitrary trajectories, and recent work on nonparaxial accelerating beams that could bend into large angles along various trajectories.