

Point 1: The results presented are not surprising since the propagation is periodic. Hence I do not see here enough novelty to warrant publication.

Response 1: Firstly, the topic is interesting and has received a large considerable of attention in recent years because the strongly nonlocal nonlinear media (SNNM) possesses a wide array of potential applications. The theoretical treatment on the medium is first introduced by Snyder and Mitchell in 1997 (Ref.1), where the derived standard propagation formula which is just used in our paper and in most of those references (Refs.4-28) cited by our paper determines the equivalent relation between describing SNNM and GRadient INdex (GRIN) medium. The properties of the material is first experimentally verified with nematic liquid crystals in 2002 (Ref.2) and with lead glass in 2005 (Ref.40), respectively. In particular, in the latter work the **stable vortex ring solitons** is also first experimentally observed.

Secondly, the propagation properties through various media of **optical vortex beams** have also received a great amount of attention in the past years. In particular, **how to prepare optical vortex beams has always been a challenging task**, and various schemes to produce optical vortex beams have been developed, yet. In this paper we investigate the propagation of an astigmatic sin-Gaussian beam in SNNM and reveal such a beam can convert into a vortex beam with perfect doughnut-shaped configuration under appropriate conditions. This is very interesting and proposes another way to generate optical vortices using an astigmatic sin-Gaussian beam with two-lobe pattern.

Thirdly, in this paper it is obtained the parameter conditions to realize the conversion of an astigmatic sin-Gaussian beam with two-lobe pattern into a vortex beam with perfect doughnut-shaped configuration. Since the stable vortex ring soliton propagation in SNNM has been reported to be experimentally realized, the result obtained in this paper can also be achieved using such media, which is pointed out in the end of this revised manuscript.

Point 2: What is really missing here is the comparison with exact nonlinear and nonlocal model. Only then one can make some definite statement about evolution of nonlocal solitons. Otherwise it is just an exercise in ABCD beam evolution.

Response 2: In nonlinear optics, nonlocality means that the refractive index of a material at a particular point is not determined solely by the wave intensity at that point (as in local media), but also depends on the wave intensity in its neighborhood. The nonlocal nonlinearity exists in many systems, such as photorefractive crystals, nematic liquid crystals, lead glasses, atomic vapors, Bose–Einstein condensates, etc. If the characteristic width of the material response function is much larger than the beam width, these media are called the strongly nonlocal nonlinear media (SNNM). So far some properties of strongly nonlocal solitons have been observed in SNNM such as nematic liquid crystals (Ref. [2] in our paper) and lead glasses (Ref. [40] in our paper).

In nonlinear optics the dynamics of optical solitons are governed by the well-known nonlinear Schrödinger equation which has been studied extensively in the past several decades. Before 1997, researchers almost focus on the optical solitons in **local** nonlinear media whose refractive index at a particular point is only related to the beam intensity at that point. By reason of the complexity of the shape-variant beams i.e. solitons or breathers, there are **relatively few investigations** on such beams in **nonlocal** media.

In 1997, Snyder and Mitchell (Ref. [1] in our paper) developed the well-known Snyder–Mitchell model today in which the nonlinear Schrödinger equation is linearized in SNNM and greatly simplified the investigation on the soliton evolution and beam propagation in such media. Since then, the propagation of optical beam in SNNM have attracted much attention, because of the discovery of many new novel nonlocal solitons.

To be specific, in the Snyder–Mitchell model the nonlinear Schrödinger equation describing the beam propagation in SNNM is simplified to the equation describing optical beam propagation through a GRIN medium. Then, the description of the beam propagation in SNNM can be also transformed into the generalized Collins integral formula with the ABCD matrix, **which is a standard method just done in our manuscript and most of Ref. [4] – [28] cited in our paper.**

Therefore, in the SNNM the simplified description used in our paper and in the cited paper (Refs. [4] – [28]) of our paper is equivalent to those in true non-locality nonlinear propagation model. And it is possible to realize the predicted conversion of a

sin-Gaussian beam with two-lobe pattern into a vortex beam with perfect doughnut-shaped pattern under proper conditions using nematic liquid crystals and lead glasses.