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Peer Review

Review of: "Multidimensional Soliton Systems: an Update"

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This manuscript serves as a concise update to the author's recent extensive review (Adv Phys X, **9**(1):2301592) a. The text effectively summarizes high-impact developments from the 2024–2025 period, specifically focusing on quantum droplets (QDs) in Bose-Einstein condensates (BECs) and novel spatiotemporal structures in optics. Given the rapid pace of this field—evidenced by the inclusion of citations from 2025—this update is timely and valuable for the community. The section on optical media with effective fractional diffraction is intriguing, particularly the 2D system with quadratic ($\chi^{(2)}$) nonlinearity. The report notes that for a Lévy index $\alpha \le 1$, the system collapses, while stable solitons exist for $1 < \alpha \le 2$. For the benefit of experimentalists, it would be helpful if the author briefly alluded to the physical realization of such fractional diffraction operators (defined via the Riesz derivative) in a $\chi^{(2)}$ cavity or waveguide setting.

I recommend that this manuscript be **accepted for publication**. The article provides a timely and valuable synthesis of rapidly evolving research on multidimensional solitons in optics and Bose-Einstein condensates.

Declarations

Potential competing interests: No potential competing interests to declare.

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