Enhanced lifespan for solutions of the fractional BBM equation

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Abstract

We consider the fractional BBM equation

$$\partial_t u + \partial_x u + u\partial_x u + \mathrm{D}^\alpha \partial_t u = 0,$$

for $0 < \alpha < 1$ and obtain an enhanced existence time for solutions with initial data in $H^{N+\frac{\alpha}{2}}(\mathbb{R})$, $N \geq 3$, of size ϵ. This is achieved using ideas from (Hunter, Ifrim, Tataru, Wong, 2015), (Ehrnström, Wang, 2018) in which the authors introduce a modified energy based on a normal form transformation in order to obtain enhanced existence times for the Burgers-Hilbert equation and the fractional KdV equation, respectively.