On Self-Organization Structure for Fluid Dynamical Systems via Solitary Waves

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Abstract: The process of self-organization occurs and is used in many aspects of life with applications found in domains of biological, physical and machining systems. Finding ways to create this kind of processes has attracted the interest of many scientists around the world. We combine in this paper some mathematical concepts to model and generate the self-organization process happening in wave motion. We make use of the Harry Dym system together with the fractal and fractional operators. The resulting model is solved numerically and its stability results are provided. Numerical simulations show the combined system involved in a self-organization dynamic with the replication of the initial objects and the formation of subsequent fractal patterns which vary with the fractional operator. The results prove that we are in the presence of a system capable of artificially structuring fractals using mathematical concepts, numerical techniques, codes and simulations.

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