

## Soliton-like solutions of the complex $\phi^6$ system in 1+1 dimensions

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Received: 30.03.2017    Final revised: 08.04.2018    Accepted: 07.05.2018

### Abstract

In this paper, we will introduce soliton-like solutions of the complex  $\phi^6$  system as an example of the complex non-linear Klein-Gordon systems in 1+1 dimensions. Complex kink (anti-kink), radiative profiles and wave-packets are three different types of soliton-like solutions for complex  $\phi^6$  system. All relativistic energy-momentum relations would be satisfied generally for such solutions. For this special system, numerical calculations show that we can detect an apparent uncertainty in the outputs of collisions of the complex kink-anti-kink pairs and the pairs of wave-packets, which originate from an arbitrary initial phase. Also in collisions between out-of-phase kink-anti-kink pairs, we can always detect radiative profiles. The reverse can also occur, i.e. in collisions between two energetic radiative profiles with zero rest masses, it is possible to create a pair of kink-anti-kink with non-zero rest masses.

**Keywords:**  $\phi^6$  system, kink, Wave packets, Radiative profiles, Uncertainty

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