Model of Soliton Waves

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Soliton waves are self-reinforcing waves that maintains their shapes while they move at constant speed. They are caused by cancellation of dispersion effect and distortion effect during the motion in the medium. Solitons are described by Sine-Gordon equations and Kortweg-de Vries equation. They can interact with other solitons, but they do not change their shape and behaviour. They have a permanent form. The only thing that can be changed is the phase shift. Solitons can be seen in water channels or some light bullets behave as solitons, etc. The aim of this work was to create a model that can be able to show soliton waves and their behaviour. It means interactions that are described in the solution of Sine-Gordon equation and Kortweg-de Vries equation. This model was successfully prepared and is suitable to demonstrate all types of these effects (e.g. kink, antikink, collision of two or three kinks etc.). The model was also designed for school lessons such as mathematics and physic to describe and explain waving principals. The “chaos element” which appeared in the pendulum system was solved applying different types of a double pendulum. It was supposed that this “chaos element” should not influence the behaviour of soliton waves, because of the soliton definition. The measurements showed that these double pendulums change the wave and the system, that does not behave as the soliton.

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