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# Are solitary waves in microtubules signals for motor proteins?

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**Microtubules (MTs) are the major part of cytoskeleton. They are long polymeric structures existing in eukaryotic cells. MTs are hollow cylinders that spread between a nucleus and cell membrane. They are involved in nucleic and cell divisions and organization of intracellular structure. The most important for this work is the fact that MTs also serve as a network for motor proteins. There are two distinct families of MT associated motor proteins that move along MTs carrying molecular and vesicular cargos. These cellular motors with dimensions of less than 100 nm convert chemical energy into useful work. Contrary to ordinary MTs, those existing in neuronal cells are uniquely stable and consequently, neurons once formed don't divide. This stability is crucial as there are evidences that neuronal MTs are responsible for processing, storage and transduction of biological information in a brain. Like all biological systems, MTs are nonlinear in their nature. Investigation of nonlinear dynamics of MTs has yielded to solitary waves moving along MTs. A recently established general model of MTs is explained. It is shown that there are three types of these solitary waves. They are: kink solitons, bell-type solitons and localized modulated waves called breathers. Two mathematical procedures for solving a crucial nonlinear differential equation are explained. They are based on semi-discrete and continuum approximations. It is interesting that the kind of the obtained soliton depends not only on the physical system but also on the used mathematical method as well. It is argued that these waves could be signals for the motor proteins to start and/or to stop moving along MT.**

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