

On the numerical solution of nonlinear system of coupled sine-Gordon equations

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Abstract: In this paper, a system of nonlinear coupled sine-Gordon, which have some powerful applications in physics and biology is considered. A special case of this system, which describe the open states in DNA double helices is studied. Numerical solution of this system is obtained by finite difference method with fixed point iteration. Some examples are considered and the results of numerical experiments are presented.

Keywords: nonlinear boundary value problems, difference equations, numerical analysis

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REFERENCES

- [1] Khusnutdinova K.R., Pelinovsky D.E., "On the exchange of energy in coupled Klein-Gordon equations", *Wave Motion* 38 (2003) 1–10 (2003).
- [2] Ashyralyev A., Yildirim O., "On multipoint nonlocal boundary value problems for hyperbolic differential and difference equations", *Taiwanese Journal of Mathematics* 14(1),165–194 (2010).
- [3] Ashyralyev A., Agirseven D., and Ceylan B., "Bounded solutions of delay nonlinear evolutionary equations", *Journal of Computational and Applied Mathematics* 318, 69–78 (2017).