## Ulam stability of a nonlinear hyperbolic partial differential equation

IOAN A. RUS and NICOLAIE LUNGU

## Abstract.

In this paper we present four types of Ulam stability for a nonlinear hyperbolic partial differential equations: Hyers-Ulam stability, generalized Hyers-Ulam stability, Hyers-Ulam-Rassias stability and generalized Hyers-Ulam-Rassias stability. Some examples are given.

## REFERENCES

- [1] Bainov, D. and Simeonov, P., Integral Inequalities and Applications, Kluwer, Dordrecht, 1992
- [2] Cădariu, L. and Radu, V., The fixed points method for the stability of some functional equations, Carpatian J. Math., 23 (2007), No. 1–2, 63–72
- [3] Groza, G., Khan A. S. M. and Pop, N., Approximate solutions of boundary value problems for ODEs using Newton interpolation series, Carpathian. J. Math. 25 (2009), No. 1, 73–81
- [4] Groza, G. and Pop, N., Approximate solution of multipoint boundary value problems for linear differential equations by polynomial functions, J. Difference Equ. Appl., 14 (2008), Issue 12, 1289–1309
- [5] Hyers, D. H., Isac, G. and Rassias, Th. M., Stability of Functional Equations in Several Variables, Birkhäuser, Basel, 1998
- [6] Jung, S.-M., Hyers-Ulam-Rassias Stability of Functional Equations in Mathematical Analysis, Hadronic Press, Palm Harbor, 2001
- [7] Jung, S.-M., A fixed point approach to the stability of a Volterra integral equation, Fixed Point Theory and Applications, 2007, 9 pages
- [8] Lakshmikantham, V., Leela, S. and Martynyuk, A. A., Stability Analysis of Nonlinear Systems, Marcel Dekke, New York, 1989
- [9] Lungu, N., Qualitative Problems in the Theory of Hyperbolic Differential Equations, Digital Data, Cluj-Napoca, 2005
- [10] Lungu, N. and Rus, I. A., Hyperbolic differential inequalities, Libertas Mathematica, 21 (2001), 35-40
- [11] Mitrinovici, D. S., Pečarić, J. E. and Fink, A. M., Inequalities Involving Functions and Their Integrals and Derivatives, Kluwer, Dordrecht, 1991
- [12] Pachpatte, B. G., Inequalities for differential and integral equations, Acad. Press, New York, 1998
- [13] Popa, D., Functional Equations. Set-Valued Solutions. Stability, U. T. Press, Cluj-Napoca, 2006
- [14] Rus, I. A., Gronwall lemma approach to the Hyers-Ulam-Rassias stability of an integral equation (to appear)
- [15] Rus, I. A., Ulam stability of ordinary differential equations, Studia Univ. Babes-Bolyai, Mathematica, 54 (2009)

BABEŞ-BOLYAI UNIVERSITY DEPARTMENT OF APPLIED MATHEMATICS KOGĂLNICEANU 1 400084 CLUJ-NAPOCA, ROMANIA *E-mail address*: iarus@math.ubbcluj.ro

TECHNICAL UNIVERSITY DEPARTMENT OF MATHEMATICS C. DAICOVICIU 15 CLUJ-NAPOCA, ROMANIA *E-mail address*: nlungu@math.utcluj.ro

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