

**CODEMA 2022**

**BOOK OF  
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**Ohrid, September 25-28, 2022**

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## A PARTICULAR SOLUTION TO THE SPECIAL CASE OF A FOURTH-ORDER SHORTENED LORENZ SYSTEM

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**Abstract.** In this paper, from the expanded class of the second-order linear differential equations, a subclass of the second-order linear differential equations will be obtained. For this subclass, a new condition for reductability according to Frobenius, as well as explicit formulas of its particular solution will be received. This subclass of the second-order linear differential equations and its particular solution, for obtaining a particular solution of the special case of the fourth-order shortened Lorenz system which was obtained from the Modified Lorenz system will be applied.

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### References

- [1] Popov S.B. (1952) *Forming of reductability criteria for some classes of linear differential equations*, Year Proceedings of the Faculty of Philosophy, University of Skopje, Department of Natural Sciences and Mathematics, Book 5, No. 2, pp.1-68.
- [2] Popov S.B.(1951) *On the reductability of the hypergeometric differential equation*, Year Proceedings of the Faculty of Philosophy of University of Skopje, Book 4, No. 7, pp.1-20.
- [3] Boro M. Piperevski, Nevena Serafimova (2002) *Existence and construction of the general solution of a class of second order differential equations with polynomial coefficients*, Seventh Macedonian Symposium on Differential Equations, Proceedings of Papers, pp. 41-52, <http://www.cim.feit.ukim.edu.mk>
- [4] Ilija A. Shapkarev, Boro M. Piperevski, Elena I. Hadzieva, Nevena Serafimova, Katerina MitkovskaTrendova (2002) *About a class of second order differential equations, whose general solution is polynomial*, Seventh Macedonian Symposium on Differential Equations, Proceedings of Papers, pp. 27-40
- [5] Boro M. Piperevski and Biljana Zlatanovska (2020) *About one B.S.Popov's result*, Balkan Journal of applied mathematics and informatics (BJAMI), Vol.3, No.2, Year 2020, pp. 15-23.
- [6] Frobenius, G. (1878) *Ueber den Begriff der Irreductibilitat der Theorie der linearen Differentialgleichungen*, Journal fur reine math. T.76 s. 236-271.
- [7] Picard,E. (1908) *Traite d'analyse*, t. III, Deuxieme edition, pp. 560-561.
- [8] B. Zlatanovska (2017) *Approximation for the solutions of Lorenz system with systems of differential equations*, Bull. Math. 41(1), pp. 51–61.
- [9] B. Zlatanovska, B. Piperevski (2020) *Dynamic analysis of the Dual Lorenz system*, Asian-European Journal of Mathematics, Vol. 13, No. 08, 2050171

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- [10] B. Zlatanovska (2014) *Numerical analysis of behavior for Lorenz system with Mathematica*, Yearbook 2014 3(3), pp. 63–71
- [11] B. Zlatanovska and D. Dimovski (2018) *Models for the Lorenz system*, Bull. Math. 42(2), pp. 75–84.
- [12] B. Zlatanovska and D. Dimovski (2012) *Systems of difference equations approximating the Lorenz system of differential equations*, Contributions Sec. Math. Tech. Sci. Manu. XXXIII 1–2, pp. 75–96.
- [13] B. Zlatanovska and D. Dimovski (2013) *Systems of difference equations as a model for the Lorenz system*, in Proc. 5th Int. Scientific Conf. FMNS, Vol. I (Blagoevgrad, Bulgaria), pp. 102–107.
- [14] B. Zlatanovska, N. Stojkovic, M. Kocaleva, A. Stojanova, L. Lazarova and R. Gobubovski (2018) *Modeling of some chaotic systems with any logic software*, TEM J. 7(2), pp. 465–470.
- [15] B. Zlatanovska and D. Dimovski (2022) *Recurrent solutions of the Lorenz system of differential equations*, Asian-European Journal of Mathematics, 2250241, ISSN (print) 1793-5571, ISSN (online) 1793-7183 (in press)
- [16] K. T. Alligood and T. D. Yorke (2000), *An Introduction to Dynamical Systems* (Springer-Verlag, USA), pp. 359-370
- [17] L.S. Pontryagin (1970) *Ordinary Differential Equations*, Russian edition (Science, Moscow)
- [18] M.A. Fathi (2012) *An analytical solution for the modified Lorenz system*, in Proc, World Congress on Engineering, Vol. 1 (London, U.K.) pp.230-233
- [19] M. W. Hirsch, S. Smale and R.L. Devaney (2004) *Differential Equations, Dynamical Systems ana an Introduction to Chaos* (Elsevier, USA) pp. 303-324
- [20] R. Barrio (2012) *Performance of the Taylor series method for ODEs/DAEs*, Computer Math. Appl. 163, pp. 525-545
- [21] B. Zlatanovska, D. Dimovski (2020) *A Modified Lorenz system: Definition and solution*, Asian-European Journal of Mathematics, Vol. 13, No. 08, 2050164 (7 pages) , ISSN (print) 1793-5571, ISSN (online) 1793-7183
- [22] B. Zlatanovska, D. Dimovski (2017) *Systems of differential equations approximating the Lorenz system*, in Proc. CMSM4 (dedicated to the centenary of Vladimir Andrunachievici 1917-1997), Chisnau, Republic of Moldova, pp.359-362
- [23] B. Zlatanovska, B.M. Piperevski (2021) *On the integrability of a class of differential equations*, Matematicki Bilten 45 (2), ISSN 0351-336X (print), ISSN 1857-9914 (online), pp. 85-93
- [24] B. Zlatanovska and B. Piperevski (2022) *A particular solution of the third-order shortened Lorenz system via integrability of a class of differential equations*, Asian-European Journal of Mathematics, 2250242, ISSN (print) 1793-5571, ISSN (online) 1793-7183 (in press),

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