

NONLINEAR INTEGRAL INEQUALITIES INVOLVING MAXIMA OF THE UNKNOWN SCALAR FUNCTIONS

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Abstract. This paper deals with some nonlinear integral inequalities that involve the maximum of the unknown scalar function of one variable. The considered inequalities are generalizations of the classical integral inequality of Gronwall–Bellman. The importance of these integral inequalities is due to their wide applications in qualitative investigations of differential equations with “maxima”, and it is illustrated by some direct applications.

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REFERENCES

- [1] RAVI P. AGARWAL, SHENGFU DENG, AND WEINIAN ZHANG, *Generalization of a retarded Gronwall-like inequality and its applications*, Appl. Math. Comput. **165**, 3 (2005), 599–612.
- [2] ELVAN AKIN-BOHNER, MARTIN BOHNER, AND FAYSAL AKIN, *Pachpatte inequalities on time scales*, JIPAM. J. Inequal. Pure Appl. Math. **6**, 1 (2005), Article 6, 23 pp. (electronic).
- [3] VASIL G. ANGELOV AND DRUMI D. BAĀNOV, *On the functional-differential equations with “maximums”*, Applicable Anal. **16**, 3 (1983), 187–194.
- [4] DRUMI D. BAĀNOV AND PAVEL SIMEONOV, *Integral inequalities and applications*, volume 57 of Mathematics and its Applications (East European Series), Kluwer Academic Publishers Group, Dordrecht, 1992. Translated by R. A. M. Hoksbergen and V. Covachev [V. Khr. Kovachev].
- [5] YEOL JE CHO, YOUNG-HO KIM, AND JOSIP PEĀARIĆ, *New Gronwall-Ou-lang type integral inequalities and their applications*, ANZIAM J. **50**, 1 (2008), 111–127.
- [6] SNEZHANA G. HRISTOVA AND LILA F. ROBERTS, *Boundedness of the solutions of differential equations with “maxima”*, Int. J. Appl. Math. **4**, 2 (2000), 231–240.
- [7] V. LAKSHMIKANTHAM AND S. LEELA, *Differential and integral inequalities: Theory and applications. Vol. I: Ordinary differential equations*, Academic Press, New York, 1969. Mathematics in Science and Engineering, Vol. 55-I.
- [8] AILIAN LIU AND MARTIN BOHNER, *Gronwall-Oulang-type integral inequalities on time scales*, J. Inequal. Appl., pages Art. ID 275826, 15, 2010.
- [9] QING-HUA MA AND JOSIP PEĀARIĆ, *On certain new nonlinear retarded integral inequalities for functions in two variables and their applications*, J. Korean Math. Soc. **45**, 1 (2008), 121–136.
- [10] QING-HUA MA AND JOSIP PEĀARIĆ, *Explicit bounds on some new nonlinear retarded integral inequalities and their applications*, Taiwanese J. Math. **13**, 1 (2009), 287–306.
- [11] A. D. MISHKIS, *On some problems of the theory of differential equations with deviating argument*, Russian Math. Surveys **32**, 2 (1977), 181–210.
- [12] BABURAO G. PACHPATTE, *Inequalities for differential and integral equations*, volume 197 of Mathematics in Science and Engineering, Academic Press Inc., San Diego, CA, 1998.
- [13] BABURAO G. PACHPATTE, *Inequalities for finite difference equations*, volume 247 of Monographs and Textbooks in Pure and Applied Mathematics, Marcel Dekker Inc., New York, 2002.
- [14] EVGENĀ PAVLOVICH POPOV, *Teoriya lineinykh sistem avtomaticheskogo regulirovaniya i upravleniya*, “Nauka”, Moscow, 1978.

- [15] WOLFGANG WALTER, *Differential and integral inequalities*, Translated from the German by Lisa Rosenblatt and Lawrence Shampine. *Ergebnisse der Mathematik und ihrer Grenzgebiete, Band 55*. Springer-Verlag, New York, 1970.