

LYAPUNOV-TYPE INEQUALITIES FOR HIGHER-ORDER DIFFERENTIAL EQUATIONS WITH ONE-DIMENSIONAL p -LAPLACIAN

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Abstract. In this paper, we establish Lyapunov-type inequalities for a single higher-order differential equation, a cycled system and a coupled system with one-dimensional p -Laplacian. Our result generalize some given results.

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REFERENCES

- [1] A. M. LYAPUNOV, *Probleme général de la stabilité du mouvement*, vol. **17**, Princeton Univ. Press, Princeton, NJ, 1949.
- [2] X. YANG, *On Liapunov-type inequality for certain higher-order differential equations*, Appl. Math. Comput. **134** (2003), 307–317.
- [3] J. P. PINASCO, *Lower bounds for eigenvalues of the one-dimensional p -Laplacian*, Abstr. Appl. Anal. **2004** (2004), 147–153.
- [4] I. SIM AND Y. LEE, *Lyapunov inequalities for one-dimensional p -Laplacian problems with a singular weight function*, J. Inequal. Appl. **2010** (2010), Article ID 865096, 9 pages.
- [5] P. HARTMAN, *Ordinary Differential Equations*, Birkhäuser, Boston, Mass, USA, 2nd edition, 1982.
- [6] G. H. HARDY, J. E. LITTLEWOOD, AND G. POLYA, *Inequalties*, Cambridge University Press, Cambridge, UK, 1978.
- [7] M. ÜNAL, D. ÇAKMAK AND A. TIRYAKI, *A discrete analogue of Lyapunov-type inequalities for nonlinear systems*, Comput. Math. Appl. **55** (2008), 2631–2642.
- [8] M. ÜNAL AND D. ÇAKMAK, *Lyapunov-type inequalities for certain nonlinear systems on time scales*, Turkish J. Math. **32** (2008), 255–275.
- [9] D. ÇAKMAK, *On Lyapunov-type inequality for a class of nonlinear systems*, Appl. Math. Comput. **216** (2010), 368–373.
- [10] D. ÇAKMAK AND A. TIRYAKI, *On Lyapunov-type inequality for quasilinear systems*, Appl. Math. Comput. **216** (2010), 3584–3591.
- [11] D. ÇAKMAK AND A. TIRYAKI, *Lyapunov-type inequality for a class of Dirichlet quasilinear systems involving the (p_1, p_2, \dots, p_n) -Laplacian*, J. Math. Anal. Appl. **369** (2010), 76–81.
- [12] X. YANG AND K. LO, *Lyapunov-type inequality for a class of even-order differential equations*, Appl. Math. Comput. **215** (2010), 3884–3890.
- [13] X. YANG, Y. KIM AND K. LO, *Lyapunov-type inequality for a class of odd-order differential equations*, J. Comput. Appl. Math. **234** (2010), 2962–2968.
- [14] X. YANG, Y. KIM AND K. LO, *A Lyapunov-type inequality for a two-term even-order differential equation*, Math. Inequal. Appl. **12** (2012), 525–528.
- [15] K. WATANABE, H. YAMAGISHI, Y. KAMETAKA, *Riemann zeta function and Lyapunov-type inequalities for certain higher order differential equations*, Appl. Math. Comput. **218** (2011) 3950–3953.
- [16] K. WATANABE, *Lyapunov type inequality for the equation including 1-dim p -Laplacian*, Math. Inequal. Appl. **12** (2012), 657–662.