

LIAPUNOV-TYPE INTEGRAL INEQUALITIES FOR P-LAPLACIAN DYNAMIC EQUATIONS ON TIME SCALES

Saroj Panigrahi

School of Mathematics and Statistics
University of Hyderabad
Hyderabad-500 046, INDIA

Corresponding author email: panigrahi2008@gmail.com

Abstract. In this paper, we estimate Liapunov-type integral inequalities for a single, cycled, and coupled dynamic system of one-dimensional p -Laplacian problems with weight functions having stronger singularities.

Keywords. Liapunov-type inequality, p -Laplacian, boundary-value problem, dynamic equations, strong singularities, time scales.

AMS (MOS) subject classification: 26 E 70, 34 C 10, 34 N 05.

References

- [1] R. Agarwal, M. Bohner and A. Peterson, Inequalities on time scales: A Survey, *Math. Ineq. Appl.* **4** (4) (2001), 535-557.
- [2] E. Akin, Boundary value problems for a differential equation on a measure chain, *Panamer. Math. J.* **10** (3) (2000), 17-30.
- [3] A. Anane, M. Moussaband O. Chakrone, Spectrum of one dimensional p-Laplacian operator with indefinite weight, *Electron. J. Qual. Theory. Differ. Equ.* **17** (2002), 1-11.
- [4] M. Bohner, A. Peterson, *Advances in Dynamic Equations on Time Scale*, Birkhäuser, 2002.
- [5] M. Bohner, S. Clark, J. Ridenhour, Liapunov inequalities for time scales, *J. of Inequal. Appl.* **7** (1) (2002), 61-77.
- [6] R. C. Brown, D. B. Hinton, Opial's inequality and oscillation of 2nd order equations, *Proc. Amer. Math. Soc.* **125** (1997), 1123-1129.
- [7] A. Cánada, J. A. Montero and S. Villegas, Lyapunov inequalities for partial equations, *J. of Fun. Anal.* **237**(1) (2006), 176-193.
- [8] S. S. Cheng, A discrete analogue of the inequality of Liapunov, *Hokkaido Math. J.* **12** (1983), 105-112.
- [9] S. S. Cheng, Liapunov inequalities for differential and difference equations, *Fasc. Math.* **23** (1991), 25-41.
- [10] R. S. Dahiya, B. Singh, A Liapunov inequality and nonoscillation theorem for a second order nonlinear differential-difference equations, *J. Math. Phys. Sci.* **7** (1973), 163-170.
- [11] S. B. Eliason, A Liapunov inequality *J. Math. Anal. Appl.* **32** (1972), 461-466.
- [12] S. B. Eliason, A Liapunov inequality for a certain nonlinear differential equation, *J. London Math. Soc.* **2** (1970), 461-466.
- [13] S. B. Eliason, A Liapunov inequalities for certain second order functional differential equations, *SIAM J. Appl. Math.* **27** (1) (1974), 180-199.
- [14] G. H. Hardy, J. E. Littlewood, and G. Polya, *Inequalities*, Cambridge University Press, Cambridge, UK, 1978.
- [15] P. Hartman, *Ordinary Differential Equations*, Wiley, New york, 1964 an Birkhäuser, Boston, 1982 MR 30 1270.
- [16] S. Hilger, Ein Maß Kettenkalkül mit Anwendung auf Zentrumsmanigfaltigkeiten, Ph. D. Thesis, Universität Würzburg, 1988.
- [17] A. M. Liapunov, Probleme général de la stabilité du mouvement (French translation of Russian paper dated 1893), *Ann. Fac. Sci. Univ. Toulouse*, **2** (1907) 27 - 247, Reprinted as *Ann. Math. Studies.* **17**, Princeton, 1947.
- [18] P. L. Nápoli and J. P. Pinasco, A Lyapunov inequality for monotone quasi-Linear operators, *Diff. and Int. Eq.* **8** (10) (2005), 1193-1200.
- [19] B. G. Pachpatte, On Liapunov-type inequalities for certain higher order differential equations, *J. Math. Anal. Appl.* **195** (1995), 527-536.
- [20] N. Parhi, S. Panigrahi, On Liapunov-type inequality for third order differential equations, *J. Math. Anal. Appl.* **233** (2) (1999), 445-460.
- [21] N. Parhi, S. Panigrahi, Liapunov-type inequality for higher order differential equations, *Math. Slovaca.* **52** (1) (2002), 31-46.
- [22] M. Del Pino, P. Drábek and R. Manásevich, The Fredholm alternative of at the first eigen value for the one-dimensional p-Laplacian, *C. R. Acad. Sci. Paris Ser. I Math.* **5** (1998), 461-465.
- [23] J. P. Pinasco, Lower bounds for eigen values of one-dimensional p-Laplacian, *Abstr. Appl. Anal.* **2004** **2** (2004), 147-153.

- [24] I. Sim and Y. H. Lee, Lyapunov Inequalities for one-dimensional p -Laplacian problems with a singular weight function, *J. of Ineq. and Appl.* (2010), 1-9.

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email: journal@monotone.uwaterloo.ca
<http://monotone.uwaterloo.ca/~journal/>