

## A LIAPUNOV INEQUALITY FOR LINEAR HAMILTONIAN SYSTEMS

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*Abstract.* A Liapunov type inequality is proved for a linear Hamiltonian system. This inequality allows estimates of intervals of disconjugacy. The inequality is particularly applicable to equations with oscillatory coefficients. A new criterion of stability is given for a differential equation with periodic coefficients.

*Mathematics subject classification (1991):* 26D10, 34C10, 34C25.

*Key words and phrases:* Liapunov inequality, disconjugacy, Hamiltonian system.

### REFERENCES

- [1] R. P. AGARWAL AND P. Y. H. PANG, *Opial Inequalities with Applications in Differential and Difference Equations*, Kluwer Academic Publishers, Dordrecht (1995).
- [2] R. W. BROCKETT, *Finite Dimensional Linear Systems*, John Wiley and Sons, New York (1970).
- [3] R. C. BROWN AND D. B. HINTON, *Opial's inequality and oscillation of 2nd order equations*, Proc. Amer. Math. Soc. **125** (1997), 1123-1129.
- [4] J. CALVERT, *Some generalizations of Opial's inequality*, Proc. Amer. Math. Soc. **18** (1967), 72-75.
- [5] SUI-SANG CHENG., *Lyapunov inequalities for differential and difference equations*, Fasc. Math. **23** (1991), 25-41.
- [6] W. A. COPPEL, *Disconjugacy*, Springer-Verlag Lecture Notes in Mathematics **220** (Berlin, 1971).
- [7] M. S. P. EASTHAM, *The Spectral Theory of Periodic Differential Equations*, Scottish Academic Press, Edinburgh (1973).
- [8] P. HARTMAN, *Ordinary Differential Equations*, John Wiley and Sons, New York (1964).
- [9] W. T. REID, *A matrix Liapunov inequality*, J. Math. Anal. Appl. **32** (1970), 424-434.
- [10] ———, *Riccati differential equations*, Academic Press, New York (1972).
- [11] ———, *A generalized Liapunov inequality*, J. Diff. Eqs. **13** (1973), 182-196.
- [12] ———, *Interrelations between a trace formula and Liapunov type inequalities*, J. Diff. Eqs. **23** (1977), 448-458.
- [13] ———, *Sturmian theory for ordinary differential equations*, Applied Math. Sciences **31** (Springer-Verlag, Berlin, 1980).
- [14] V. A. YAKUBOVICH AND V. M. STARZHINSKII, *Linear Differential Equations with Periodic Coefficients*, John Wiley and Sons, New York **Vol. II** (1975).