

Muldowney, James S.

Dichotomies and asymptotic behaviour for linear differential systems. (English)

Zbl 0559.34049

Trans. Am. Math. Soc. 283, 465-484 (1984).

General necessary and sufficient conditions that a system of differential equations (*) $x' = A(t)x$ have a dichotomy are given in terms of Lyapunov type functions. Specific criteria are given which do not require either boundedness of the matrix $A(t)$, or more generally that solutions of (*) have bounded growth or decay. A criterion using a generalized growth condition is also determined. Some further questions concerning the asymptotic behavior of solutions are addressed.

Reviewer: T.Gard

MSC:

- 34D05 Asymptotic properties of solutions to ordinary differential equations
- 34C30 Manifolds of solutions of ODE (MSC2000)
- 34A30 Linear ordinary differential equations and systems
- 34D20 Stability of solutions to ordinary differential equations

Cited in 4 Reviews
Cited in 27 Documents

Keywords:

dichotomy; Lyapunov type functions; growth condition

Full Text: [DOI](#)

References:

- [1] Dennis D. Berkey, Comparative exponential dichotomies and column diagonal dominance, J. Math. Anal. Appl. 55 (1976), no. 1, 140 – 149. · Zbl 0346.34032 · doi:10.1016/0022-247X(76)90283-3
- [2] W. A. Coppel, Stability and asymptotic behavior of differential equations, D. C. Heath and Co., Boston, Mass., 1965. · Zbl 0154.09301
- [3] W. A. Coppel, Dichotomies in stability theory, Lecture Notes in Mathematics, Vol. 629, Springer-Verlag, Berlin-New York, 1978. · Zbl 0376.34001
- [4] Ju. L. Dalec\(\hat{\prime}\)kiř and M. G. Kreĩn, Stability of solutions of differential equations in Banach space, American Mathematical Society, Providence, R.I., 1974. Translated from the Russian by S. Smith; Translations of Mathematical Monographs, Vol. 43.
- [5] Philip Hartman, The existence of large or small solutions of linear differential equations, Duke Math. J. 28 (1961), 421 – 429. · Zbl 0102.30301
- [6] A. C. Lazer, Characteristic exponents and diagonally dominant linear differential systems, J. Math. Anal. Appl. 35 (1971), 215 – 229. · Zbl 0215.43901 · doi:10.1016/0022-247X(71)90246-0
- [7] Jack W. Macki and James S. Muldowney, The asymptotic behaviour of solutions to linear systems of ordinary differential equations, Pacific J. Math. 33 (1970), 693 – 706. · Zbl 0183.36002
- [8] Marvin Marcus and Henryk Minc, A survey of matrix theory and matrix inequalities, Allyn and Bacon, Inc., Boston, Mass., 1964. · Zbl 0247.15002
- [9] José Luis Massera and Juan Jorge Schäffer, Linear differential equations and function spaces, Pure and Applied Mathematics, Vol. 21, Academic Press, New York-London, 1966. · Zbl 0243.34107
- [10] James S. Muldowney, On the dimension of the zero or infinity tending sets for linear differential equations, Proc. Amer. Math. Soc. 83 (1981), no. 4, 705 – 709. · Zbl 0484.34003
- [11] Kenneth J. Palmer, A diagonal dominance criterion for exponential dichotomy, Bull. Austral. Math. Soc. 17 (1977), no. 3, 363 – 374. · Zbl 0363.34006 · doi:10.1017/S0004972700010649
- [12] Binyamin Schwarz, Totally positive differential systems, Pacific J. Math. 32 (1970), 203 – 229. · Zbl 0193.04501
- [13] E. C. Titchmarsh, The theory of functions, Oxford Univ. Press, London, 1960. · Zbl 0005.21004
- [14] Taro Yoshizawa, Stability theory by Liapunov’s second method, Publications of the Mathematical Society of Japan, No. 9, The Mathematical Society of Japan, Tokyo, 1966.

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically

matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.