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Properties of the weighted logarithmic matrix norms. (English) Zbl 1144.15018
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The properties of weighted logarithmic matrix norms are studied. The logarithmic norm of a matrix A is defined by the relation

$$\mu[A] = \lim_{\Delta \rightarrow 0^+} \frac{\|I + \Delta A\| - 1}{\Delta},$$

for the matrix norm $\|\cdot\|$ induced by a vector norm in \mathcal{R}^n . The elliptic logarithmic norm, the logarithmically ε -efficient matrix norm, and the weighted logarithmic matrix norm are discussed. An equivalence relation between the elliptic logarithmic matrix norm and the weighted logarithmic matrix norm is presented. Based on the Lyapunov equation for the matrix A and a symmetric positive definite matrix H , two weighted H logarithmic matrix norms are constructed which are less than the 1-logarithmic norm and the ∞ -logarithmic norm, respectively. An iterative scheme is presented to obtain the logarithmically ε -efficient matrix norm. Two numerical examples are presented.

Reviewer: [Václav Burjan \(Praha\)](#)

MSC:

[15A60](#) Norms of matrices, numerical range, applications of functional analysis to matrix theory Cited in 2 Documents
[15A24](#) Matrix equations and identities
[65F30](#) Other matrix algorithms (MSC2010)

Keywords:

[logarithmic matrix norm](#); [logarithmically \$\varepsilon\$ -efficient norm](#); [Lyapunov equation](#); [numerical examples](#)

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