Periodic symplectic difference systems

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We consider symplectic difference systems

$$z_{k+1} = S_k(\lambda) z_k, \quad S_k \in \mathbb{R}^{2n \times 2n},\ z \in \mathbb{R}^{2n}, \tag{1}$$

depending on a (generally complex valued) parameter λ. We suppose that the matrices S_k are J-unitary, i.e.

$$S^*(\lambda)\mathcal{J}S(\lambda) = \mathcal{J}, \quad \mathcal{J} = \begin{pmatrix} 0 & I \\ -I & 0 \end{pmatrix},$$

and N-periodic, i.e., $S_{k+N}(\lambda) = S_k(\lambda)$, $k \in \mathbb{N}$. We show that some previous results on periodic Hamiltonian difference systems [2, 3] (which are a special case of (1)) can be extended to (1). In particular, we demonstrate that the classical Krein's traffic rules for multipliers of the monodromy matrix of periodic Hamiltonian *differential* systems, cf. [1], remain to hold also for periodic symplecitc difference systems.

References

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[3] V. Rasvan, *Stability zones for discrete time Hamiltonian systems*, Arch. Math. (Brno) **36** (2000), 563–573.