New directions in oscillation theory of linear Hamiltonian systems

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We present a new approach for the study of the oscillation properties of linear differential equations, in particular of linear Hamiltonian systems. We introduce a new notion of a generalized focal point as well as its multiplicity, which do not depend on the validity of the traditionally assumed Legendre condition. We provide a local version of the Sturmian separation theorem, which involves a lower bound and an upper bound for the multiplicity of a generalized focal point for any conjoined basis of the system. As a main tool we use the comparative index, which was originally applied in the discrete oscillation theory.

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[2] J. V. Elyseeva, *Comparative index for solutions of symplectic difference systems*, Differential Equations **45** (2009), no. 3, 445–459.

[3] P. Šepitka, R. Šimon Hilscher, *Comparative index and Sturmian theory for linear Hamiltonian systems*, J. Differential Equations **262** (2017), no. 2, 914–944.

[4] P. Šepitka, R. Šimon Hilscher, *Generalized focal points and local Sturmian theory for linear Hamiltonian systems*, Discrete Contin. Dyn. Syst. **43** (2023), no. 12, 4139–4173.