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Singular Sturmian comparison theorems for even order differential equations and linear Hamiltonian systems

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This work was obtained jointly with Peter Šepitka (Masaryk University, Brno). In 2010, Aharonov and Elias proved a singular comparison theorem for two second order differential equations satisfying the Sturmian majorant condition. In this talk we present how this result can be generalized to two linear Hamiltonian systems. At the same time we do not impose any controllability condition. The results are phrased in terms of the comparative index and the numbers of proper focal points of the (minimal) principal solutions of these systems at both endpoints of the considered interval. The main idea is based on an application of new transformation theorems for principal and antiprincipal solutions at infinity and on new limit properties of the comparative index involving these solutions. The results are new even for completely controllable linear Hamiltonian systems, notably also for even order Sturm–Liouville differential equations. In this way we also obtain an extension of the previous result of Aharonov and Elias.

[1] D. Aharonov, U. Elias, Singular Sturm comparison theorems, *J. Math. Anal. Appl.*, **371**(2010), No. 2, 759–763.

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[3] P. Šepitka, R. Šimon Hilscher, Sturmian comparison theorems for completely controllable linear Hamiltonian systems in singular case, *J. Math. Anal. Appl.*, **487**(2020), No. 2, 124030.