Friedrichs extension for operators associated with symplectic systems (and their special cases)

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The theory of the *Friedrichs extension* goes back to J. von Neumann and it was shown by Friedrichs in 1934 that for a symmetric densely defined linear operator $\mathcal{L}$ which is bounded below in a Hilbert space H, there exists at least one self-adjoint extension of the minimal operator associated with $\mathcal{L}$ with the same lower bound.

In this talk, we present recent progress achieved in this field with a focus on operators connected with some special cases of symplectic systems (more specifically, with the linear Hamiltonian differential system and with any even order Sturm–Liouville dynamic equation on a time scale), see [1, 2, 3]. We also discuss an open problem concerning the Friedrichs extension for operators associated with a symplectic difference system.

References

[1] R. Šimon Hilscher and P. Zemánek, *Friedrichs extension of operators defined by linear Hamiltonian systems on unbounded interval*, in "Equadiff 12", Proceedings of the Conference on Differential Equations and their Applications (Brno, 2009), J. Diblík, O. Došlý, P. Drábek, and E. Feistauer, editors, Math. Bohem. **135** (2010), no. 2, 209–222.

[2] P. Zemánek, *Krein–von Neumann and Friedrichs extensions for second order operators on time scales*, in "Dynamic Equations on Time Scales and Applications" (L. H. Erbe and A. C. Peterson, editors), Int. J. Dyn. Syst. Differ. Equ. **3** (2011), no. 1-2, 132–144.

[3] P. Zemánek and P. Hasil, *Friedrichs extension of operators defined by Sturm–Liouville equations of higher order on time scales*, Appl. Math. Comput. (2012), to appear.