Forms and cosine functions

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Operator cosine functions were invented to help understanding abstract second order Cauchy problems as strongly continuous semigroups are analogous to exponential functions in solving first order (in time) abstract Cauchy problems. There is an excellent introduction into this subject in [1].

Crouzeix proved in 2004 that if a form has numerical range in a suitable parabola, then the corresponding operator generates a cosine function. We refer to the monograph by Haase [3] for this result with detailed complete proofs.

In the project we will try to understand this result, and more general connections between numerical range and functional calculus.

References

[1] Arendt, W., Batty, Ch., Hieber, M., Neubrander, F., "Vector-valued Laplace Transforms and Cauchy Problems", Birkhäuser Verlag, Monographs in Mathematics **96**, 2011.

[2] Arendt, W., Batty, Ch. *Forms, functional calculus, cosine functions and perturbation.* Perspectives in operator theory, 17-38, Banach Center Publ., **75**, Polish Acad. Sci., Warsaw, 2007.

[3] Haase, M. The functional calculus for sectorial operators. Operator Theory: Advances and Applications, **169**. Birkhäuser Verlag, Basel, 2006.

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