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## **Cosine Functions and Functional Calculus**

In my talk I shall report on the functional calculus approach to cosine operator functions. Starting with an operator A with spectrum in a parabola and satisfying certain resolvent growth conditions one constructs a *holomorphic* functional calculus that allows to form the operator family  $\text{Cos}_A(t), t \in \mathbb{R}$ , as unbounded closed operators. A generation theorem emerges that is closely related to the complex inversion formula for the Laplace transform.

On the other hand, given that A is indeed the generator of a cosine function  $(C(t))_{t \in \mathbb{R}}$ with associated sine function  $(S(t))_{s \in \mathbb{R}}$ , one can define a *Hille–Phillips* type functional calculus for A. The "decoupling identity"

$$C(s+t) = C(s)C(t) + AS(s)S(t) \qquad (s,t \in \mathbb{R})$$

is the key to a transference principle with interesting consequences.

The talk is based on [1]. The second part extends and simplifies results from [4] and [2] and is related to [3].

## References

- HAASE, M., The functional calculus approach to cosine operator functions. To appear in: Trends in Analysis. Proceedings of the Conference in honour of N.K. Nikolski held in Bordeaux August 2011
- [2] HAASE, M., A transference principle for general groups and functional calculus on UMD spaces, Mathematische Annalen 345, Number 2 (2009), 245-265.
- [3] HAASE, M., The group reduction for bounded cosine functions on UMD spaces, Mathematische Zeitschrift 262 (2) (2009), 281-299.
- [4] HAASE, M., Functional calculus for groups and applications to evolution equations, Journal of Evolution Equations 7 (2007), 529-554.