Non-uniform stability of damped contraction semigroups
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Abstract. In this presentation we study the stability properties of strongly continuous semigroups generated by operators of the form $A - BB^*$, where A generates a unitary group or a contraction semigroup, and B is a possibly unbounded operator. Such semigroups are encountered in the study of hyperbolic partial differential equations with damping on the boundary or inside the spatial domain. In the case of multidimensional wave equations with viscous damping, the associated semigroup is often not uniformly exponentially stable, but is instead only *polynomially* or *non-uniformly stable*. Motivated by such situations, we present general sufficient conditions for polynomial and non-uniform stability of the semigroup generated by $A - BB^*$ in terms of generalised observability-type conditions of the pair (B^*, A). The proofs in particular involve derivation of resolvent estimates for the operator $A - BB^*$ on the imaginary axis. In addition, we apply the results in studying the stability of hyperbolic PDEs with partial or weak dampings.

The research is joint work with R. Chill, D. Seifert, R. Stahn and Y. Tomilov and the results are presented in the reference [1].

References
[1] R. Chill, L. Paunonen, D. Seifert, R. Stahn, and Y. Tomilov. *Non-uniform stability of damped contraction semigroups.* // Anal. PDE, accepted for publication. Preprint available at https://arxiv.org/abs/1911.04804

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