A HILBERT SPACE APPROACH TO FRACTIONAL DIFFERENTIAL EQUATIONS

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The project will be centered around [2]. There, the theory of evolutionary equations is applied to fractional ODEs, that is to say, ordinary differential equations in which a fractional time derivative $\partial_{t,\nu}^{\alpha}$ appears on the left-hand side instead of the usual (full) time derivative. We consider two models that originate from different choices of initial data. The material law from [1, Lecture 5, Example 5.3.1 (e) and 5.3.3 (e)] as well as the extrapolation space of $\partial_{t,\nu}^{\alpha}$ will play important roles.
Depending on the interests of the participants, the project may be extended by additional topics such as general fractional powers of operators or interpolation spaces.

This project is suited for 3 to 4 students.

References

[1] ISem 23 Lecture Notes, 2020.
[2] K. Diethelm, K. Kitzing, R. Picard, S. Siegmund, S. Trostorff, and M. Waurick. A Hilbert space approach to fractional differential equations. arxiv preprint `https://arxiv.org/abs/1909.07662`