Approximation in time of fractional equations

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Abstract: In this talk we continue our investigations [1] on discretization of differential equations of fractional order in time.

Recently, in [2] and [3] were considered the relation between well-posed Cauchy problems

$$v'(t) = A^l v(t) + g(t), t > 0, v(0) = u^0,$$

and

$$(\mathbf{D}_t^{1/l} u)(t) = Au(t), t > 0, u(0) = u^0.$$

Moreover, they have shown that for such kind problems with the operator A which generates analytic C_0-semigroup one has $v(t) \equiv u(t)$ for any $t > 0$ as soon as $l = 2$ and special choice of $g(t)$.

In this talk, we would like to use such kind of relations for discretization of differential equations of fractional order in abstact spaces.

References

[1] Liu, R., Li, M., Pastor, J. and Piskarev, S., " On the approximation of fractional resolution families." *Differential Equations* **50** (7), pp. 927-937, 2014.
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[3] Li, M., Chuang, Ch., Li, Fu-Bo., "On fractional powers of generators of fractional resolvent families." *J. Funct. Anal.* 259, No. 10, pp. 2702-2726, 2010.