Hypercyclic and topologically mixing properties of certain classes of abstract time-fractional equations

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In recent years, considerable effort has been directed toward the topological dynamics of abstract PDEs whose solutions are governed by various types of operator semigroups, fractional resolvent operator families and evolution systems. In this talk, we shall present the most important results about hypercyclic and topologically mixing properties of some special subclasses of the abstract time-fractional equations of the following form:

$$\mathbf{D}_t^{\alpha_n} u(t) + c_{n-1}\mathbf{D}_t^{\alpha_{n-1}} u(t) + \cdots + c_1\mathbf{D}_t^{\alpha_1} u(t) = A\mathbf{D}_t^{\alpha} u(t), \quad t > 0,$$
$$u^{(k)}(0) = u_k, \quad k = 0, \cdots, \lceil \alpha_n \rceil - 1,$$

where $n \in \mathbb{N} \setminus \{1\}$, A is a closed linear operator acting on a separable infinite-dimensional complex Banach space E, $c_1, \cdots, c_{n-1}$ are certain complex constants, $0 \le \alpha_1 < \cdots < \alpha_n, 0 \le \alpha < \alpha_n$, and $\mathbf{D}_t^{\alpha}$ denotes the Caputo fractional derivative of order α. We slightly generalize results from [1] and provide several applications, including those to abstract higher order differential equations.

References

[1] Marko Kostić, *Hypercyclicity and Topologically Mixing Property for Abstract Time-Fractional Equations*, Dynamical Systems: An International Journal, in press.