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Fractional Calculus: From Origins to Modern Perspectives

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Abstract

In this presentation, we offer a brief historical overview of fractional calculus, emphasizing the development of its principal concepts, including the various fractional derivatives introduced in the literature, as well as more recent formulations such as tempered, conformable, and non-singular kernel operators. We then outline our team?s contributions on each notion within this evolving framework, highlighting our work on generalized fractional operators, the introduction of new fractional operators, progress in the study of fractional differential equations, and investigations into different stability properties. Finally, we discuss the current state of research in the field and conclude with perspectives on emerging directions that are likely to influence the next phase of development in fractional calculus.

Mathematics Subject Classification : 34A08, 26A33, 34A12, 34B15.

Keywords: Fractional calculus, generalized fractional operators, singular and non-singular kernels, stability analysis, nonlocality and memory.

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