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Mamikon Gulian on Fractional Calculus /u0026

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Purdue University. Abstract. This book aims to  
provide the basic theory of fractional calculus and



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its applications based on practical schemes and approaches, illustrated with applicable engineering and technical examples, especially focusing on the fractional-order controller design. In the development of this book, the essential theorems and facts in the first two chapters are proven with rigorous mathematical analyses.

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which basic definitions of fractional derivatives and spaces are presented. The central part of the book contains various applications in classical mechanics including fields such as: viscoelasticity, heat conduction, wave propagation and variational Hamilton–type principles.

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Fractional calculus is allowing integrals and derivatives of any positive order (the term fractional is kept only for historical reasons). It can be

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$$\{ \underset{\text{D}}{\circ} \}^n (f) = \underset{\text{D}}{\circ} \underset{\text{D}}{\circ} \underset{\text{D}}{\circ} \cdots \underset{\text{D}}{\circ} (f)$$

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$(D / \text{cdots} )_{- \{n\} } (f) \}$ .

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Fractional calculus is at this stage an arena where many models are still to be introduced, discussed and applied to real world applications in many branches of science and engineering where nonlocality plays a crucial role. Although researchers have already reported many excellent results in several seminal monographs and review articles, there are still a large number of non-local

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