

Fractional Calculus: The Core Motivation and Real Applications

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Abstract

Fractional calculus is about differentiation/integration of non-integer orders. Rejecting fractional calculus is like saying there is no other numbers between two neighboring integers. In this tutorial talk, I will explain the core motivation of fractional calculus by first showing the “core motivation” of (integer-order) calculus invented by Newton and Leibnitz which could be traced back to the time of Heraclitus of Ephesus. My concise messages are that the “integer order calculus” is driven by “the desire and the need” of “quantification of changes” while “non-integer order calculus” is by “the desire and the need of understanding complexities”. I then propose the FOT – fractional order thinking and the “better than the best” type of defense of fractional calculus. I will also show some compelling applications in real world as time allows.

References

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