Accepted Manuscript

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PII: S0378-4371(15)00785-2
DOI: http://dx.doi.org/10.1016/j.physa.2015.09.049
Reference: PHYSA 16428

To appear in: *Physica A*

Received date: 24 February 2015
Revised date: 7 September 2015

Please cite this article as: F. Buyukkilic, Z. Ok Bayrakdar, D. Demirhan, Investigation of the cumulative diminution process via Fibonacci method and fractional calculus, *Physica A* (2015), http://dx.doi.org/10.1016/j.physa.2015.09.049

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INVESTIGATION OF THE CUMULATIVE DIMINUTION PROCESS VIA FIBONACCI METHODand FRACTIONAL CALCULUS

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Abstract

In this paper,cumulative diminution phenomenon of a physical quantity and also a diminution process with aconstant acquisition quantity in each step take place which in a viscous mediumare discussed.The existence of dynamical mechanism lying under the success of fractional calculusin comparison to standard mathematics in describing stochastic processes is put forward by Fibonacci approach assuming that the complex processes evolvecumulatively in fractal space and discrete time. In this regard, differential-integral order$\alpha$is being attained a meaning involving the viscosity of the medium that the process evolves in.The future value of the diminishing physical quantity is obtained in terms of Mittag-Leffler function(MLF) and from the asymptotic limits,two laws in rheology are inferred.As a result, we came to the conclusion that the differential-integral calculus of fractional mathematics embodiesimplicitlythe cumulative diminution mechanism occurring in a viscous medium.

MSC 2010: 26A33, 33E12, 11B39,

Key words: Fractional calculus, Mittag-Leffler function , Fibonacci numbers, rate equation

Introduction

It is very common in nature that physical systems are disintegrated, decreased by diminution and finally terminate or system gain and lost may compensate and thus the system stay in steady state, or they it may accumulate,that is grows up[1-6].In this study we have investigated the compound diminishing of a system and a diminishing system which is in a viscous medium and has a constant acquisition quantity in each step of the process.The similar process of nature canalso be seen in human behaviour [7-9]but it is not in the scope of our study.Within the framework of the standard mathematics Hamilton'sequations for motion of bodieswhich move randomly,for example ,Brownian motion, deterministic mechanical approach is inadaquate to constitute a dynamical basis for the statistical description of the complex systems[10-25].It canbe state that deterministic

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