A MATHEMATICAL DESCRIPTION OF BIODIVERSITY EVOLUTION. J.E. Horvath[1],
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Abstract: We present in this work a mathematical description of biodiversity evolution based on a second-order differential equation (the framework also known as ``inertial/galilean view''). After discussing the motivations and explicit forms of the simplest ``forces'', we are lead to an equation analogue to a harmonic oscillator. The known solutions for the homogeneous problem and its Green functions are then tentatively related to the biodiversity curve of Alroy et al. [1] and Sepkoski [2,3], suggesting mostly an inertial behavior of the time evolution of the number of genera, with direct connections between observed drop times after massive extinctions and mathematical constants. We show that the simplest models fall short of explaining the full recovery after a massive extinction and therefore a more complex modeling is required.

References:

[1] Alroy J. et al. (2008) *Science, 321*, 97-100.
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[3] Sepkoski J. J.. (1996) , in *Global Events and Event Stratigraphy*, O. H. Walliser, Ed. (Springer, Berlin, 1996), 35–52.