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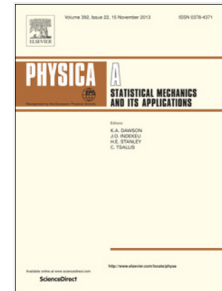
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**Modeling statistics and kinetics of the natural aggregation structures and processes
with the solution of generalized logistic equation**

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Abstract

The generalized logistic equation is proposed to model kinetics and statistics of natural processes such as earthquakes, forest fires, floods, landslides, and many others. This equation has the form

$$\frac{dN(A)}{dA} = s \cdot (1 - N(A)) \cdot N(A)^q \cdot A^{-\alpha},$$

$q > 0$ and $A > 0$ is the size of an element of a structure, and $\alpha \geq 0$. The equation contains two exponents α and q taking into account two important properties of elements of a system: their fractal geometry, and their ability to interact either to enhance or to damp the process of aggregation. The function $N(A)$ can be understood as an approximation to the number of elements the size of which is less than A . The function $dN(A)/dA$ where $N(A)$ is the general solution of this equation for $q=1$ is a product of an increasing bounded function and power-law function with stretched exponential cut-off. The relation with Tsallis non-extensive statistics is demonstrated by solving the generalized logistic equation for $q > 0$. In the case $0 < q < 1$ the equation models super-additive, and the case $q > 1$ it models sub-additive structures. The Gutenberg-Richter

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