

Abstract Submitted  
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**The Modified Rayleigh-Benard Convection Problem and its Application to Permafrost Methane Emission Modeling** IVAN SUDAKOV, Physics Department, University of Dayton, SERGEY VAKULENKO, Institute for Problems in Mechanical Engineering, Russian Academy of Sciences — The original Rayleigh-Benard convection is a standard example of the system where the critical transitions occur with changing of a control parameter. We will discuss the modified Rayleigh-Benard convection problem which includes the radiative effects as well as the specific gas sources on a surface. Such formulation of this problem leads to identification a new kind of nonlinear phenomenon, besides the well-known Benard cells. Modeling of methane emissions from permafrost into the atmosphere drives to difficult problems, involving the Navier-Stokes equations. Taking into account the modified Rayleigh-Benard convection problem, we will discuss a new approach which makes the problem of a climate catastrophe in the result of a greenhouse effect more tractable and allows us to describe catastrophic transitions in the atmosphere induced by permafrost greenhouse gas sources.

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