

Seminario della prof.ssa **Ekaterina Gromova**
(**St. Petersburg University**)

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**Differential game model of resource extraction with
composite distribution function for random time horizon**

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Abstract

A differential game with random terminal time is considered. In many cases the probability density function of the terminal time may change depending on some conditions, which can be expressed as a function of time and state. Consider, for instance, the example of the development of a mineral deposit. The probability of a breakdown may depend on the development stage. At the initial stage, this probability is higher than during the routine mining operation. Therefore, one needs to define a composite distribution function for the terminal time. An application of the obtained theoretical results is presented. We investigate a simple model of non-renewable resource extraction with N players, where the termination time is a random variable with a composite distribution function. We study two different switching rules: time-dependent and state-dependent ones. In the first case, the switching time is fixed a priori, while in the second case the switching time is found as a solution of an equation in state variable (e.g., when the resource decreases below some threshold). A qualitative analysis of the obtained results is presented.