

**FINITELY ADDITIVE MEASURES IN
THE ERGODIC THEORY OF MARKOV CHAINS. II***A. I. Zhdanok*

We develop a new approach to the study of general Markov chains (MC), i.e.; homogeneous Markov processes with discrete time on an arbitrary phase space. In the first part of the article, we suggested an extension of the traditional space of countably additive measures to the space of finitely additive measures. Given an arbitrary phase space, we constructed its “gamma-compactification” to which we extended each Markov chain. We established an isomorphism between all finitely additive Markov chains on the initial space and Feller countably additive chains on its “gamma-compactification.” Using the above construction, in the second part, we prove weak and strong ergodic theorems that establish a substantial dependence of the asymptotic behavior of a Markov chain on the presence and properties of invariant finitely additive measures. The study in the article is carried out in the framework of functional operator approach.

Key words and phrases: finitely additive measure, countably additive measure, Markov chain, Markov operators, arbitrary phase space, compactification of an arbitrary phase space, extension of a Markov chain to the compactification, invariant measure, ergodic theorems.

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