THE INTERNATIONAL MEETING

ISDG12-GTM2019

July 03-05, 2019 **St. Petersburg, Russia**

ABSTRACTS

Edited by Leon A. Petrosyan and Nikolay A. Zenkevich

St. Petersburg State University
St. Petersburg
2019

ST. PETERSBURG STATE UNIVERSITY
THE INTERNATIONAL SOCIETY OF DYNAMIC GAMES

INTERNATIONAL MEETING ON GAME THEORY

Joint meeting of "12th International ISDG Workshop" (ISDG12) and "13th International Conference on Game Theory and Management" (GTM2019)

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УДК 518.9, 517.9, 681.3.07

INTERNATIONAL MEETING on GAME THEORY. Collected abstracts of papers presented on the international conference ISDG12-GTM2019 as joint meeting of "12th International ISDG Workshop" (ISDG12) and "13th International Conference on Game Theory and Management" (GTM2019) / Editors Leon A. Petrosyan and Nikolay A. Zenkevich. – SPb.: St. Petersburg State University, 2019. – 121 p.

The collection contains abstracts of papers accepted for the International Meeting on Game Theory (ISDG12-GTM2019, July 03-05, 2019, St. Petersburg State University, St. Petersburg, Russia). The presented abstracts belong to the field of dynamic game theory and its applications. The abstract volume may be recommended for researches and post-graduate students of management, economic and applied mathematics departments.

Computer design: Maria Bulgakova

МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ ПО ТЕОРИИ ИГР. Сб. тезисов Международной конференции ISDG12-GTM2019 как объединенной конференции 12-го симпозиума Международного общества динамических игр и 13-ой Международной конференции по теории игр и менеджменту / Под ред. Л.А. Петросяна и Н.А. Зенкевича. – СПб.: Санкт-Петербургский государственный университет, 2019. – 121 с.

Сборник содержит тезисы докладов участников Международной конференции по теории игр (ISDG12-GTM2019, 03–05 июля 2019 года, Санкт-Петербургский государственный университет, Санкт-Петербург, Россия). Представленные тезисы относятся к теории динамических игр и её приложениям. Тезисы представляют интерес для научных работников, аспирантов и студентов старших курсов университетов, специализирующихся по менеджменту, экономике и прикладной математике.

Компьютерная верстка: М.А. Булгакова

Plenary Speakers

Xiaotie Deng	Peking University, China
Ehud Lehrer	Tel-Aviv University, Israel
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David Ramsey	Wroclaw University of Science and Technology, Poland
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Nonlinear Pursuit Problem Discribed by System of Order Two

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Keywords: *differential game, nonlinear system, pursuer, evader.*

Differential game $\Gamma(x_0, \dot{x}_0)$ of two players is considered in the space $\mathbb{R}^k (k \geqslant 2)$ and described by next system of differential equations

$$\ddot{x} = f(x,u) + g(x,v), \quad u \in U, \quad v \in V, \quad x(0) = x_0, \quad \dot{x}(0) = \dot{x}_0,$$

where $U = \{u_1, \ldots, u_m\} \subset \mathbb{R}^l$ — value set of the pursuer control, $V \subset \mathbb{R}^s$ — compact — value set of the evader control. The pursuer's purpose is a system translation in finite time to any given neighborhood of zero. Pursuer use piecewise open-loop strategies constructed only by using information on state coordinates and velocity in partition points of time interval. Sufficient conditions of capture problem solvability in the piecewise open-loop strategies class is obtained. Also, it is proved that the capture time tends to zero with the approach the initial position to zero. It happens independent of the evader's actions. The solution of this problem based on the positive basis notion [1].

The following theorem is true.

Theorem 1. *Let* $f(0,u_1), \ldots, f(0,u_m)$ *is a positive basis* $-g(0,V) \subset \mathrm{Int}(\mathrm{co}\{\mathrm{f}(0,\mathrm{u}_1), \ldots, \mathrm{f}(0,\mathrm{u}_\mathrm{m})\})$. *Then, there exist values* $\varepsilon > 0$, $\theta > 0$ *and* $T > 0$ *such that for any initial positions* $x_0, \dot{x}_0$ *that inequality* $\|x(0)\| + \theta\|\dot{x}(0)\| \leqslant \varepsilon$ *holds, capture occurs in the game* $\Gamma(x_0, \dot{x}_0, T)$.

References:

[1] Petrov N.N. On autonomic systems controllability, *Differ. Uravn.*, 1968, vol. 4, no. 4, pp. 606–617 (in Russian).

[2] Shchelchkov K.A. A nonlinear pursuit problem with discrete control and incomplete information, *Vestn. Udmurt. Univ. Mat. Mekh. Komp'yut. Nauki*, 2018, issue 1, pp. 111–118 (in Russian). DOI: 10.20537/vm180110.

Index