Ivanov, I.; **Imsland, Lars**; **Bogdanova, B.**

Iterative algorithms for computing the feedback Nash equilibrium point for positive systems.

(English) Zbl 1362.49022
Int. J. Syst. Sci., Princ. Appl. Syst. Integr. 48, No. 4, 729-737 (2017).

Summary: The paper studies N-player linear quadratic differential games on an infinite time horizon with deterministic feedback information structure. It introduces two iterative methods (the Newton method as well as its accelerated modification) in order to compute the stabilizing solution of a set of generalized algebraic Riccati equations. The latter is related to the Nash equilibrium point of the considered game model. Moreover, we derive sufficient conditions for convergence of the proposed methods. Finally, we discuss two numerical examples so as to illustrate the performance of both of the algorithms.

MSC:

49N75	Pursuit and evasion games
49N10	Linear-quadratic optimal control problems
91A06	n-person games, $n > 2$
91A23	Differential games (aspects of game theory)
49M15	Newton-type methods

Keywords:

H_∞ optimal control problem; feedback Nash equilibrium; generalized Riccati equation; stabilizing solution; positive system; N-player linear quadratic differential games

Full Text: DOI

References:

[1] DOI: 10.3166/ejc.11.1-10 · Zbl 1293.93172 · doi:10.3166/ejc.11.1-10
[2] Basar B., Dynantic noncooperative game theory (1999)
[3] DOI: 10.1137/1.9781611971262· doi:10.1137/1.9781611971262
[4] DOI: 10.1016/S0024-3795(00)00144-0 · Zbl 0982.65050 · doi:10.1016/S0024-3795(00)00144-0
[5] DOI: 10.1007/3-540-34774-7_9· doi:10.1007/3-540-34774-7$_9$
[6] Dragan V., Mathematical Reports, 9 (59) pp 35– (2007)
[7] DOI: 10.1007/BF03323366 · Zbl 1117.34053 · doi:10.1007/BF03323366
[8] DOI: 10.1002/9781118033029· doi:10.1002/9781118033029
[9] DOI: 10.1137/090758593 · Zbl 1207.91068 · doi:10.1137/090758593
[10] DOI: 10.1016/S0024-3795(02)00651-1 · Zbl 1070.34054 · doi:10.1016/S0024-3795(02)00651-1
[11] DOI: 10.1137/S089547989834980X · Zbl 0973.65025 · doi:10.1137/S089547989834980X
[12] DOI: 10.1016/j.na.2007.10.034 · Zbl 1162.65020 · doi:10.1016/j.na.2007.10.034
[13] Jank G., Proceedings of MTNS pp 1– (2004)
[14] Kantorovich L., Functional analysis innormed spaces (1964)
[15] DOI: 10.1007/978-1-4612-4274-1_17· doi:10.1007/978-1-4612-4274-1$_1$7
[16] DOI: 10.2307/1906922 · Zbl 0063.03906 · doi:10.2307/1906922
[17] DOI: 10.1007/BF00929443 · Zbl 0169.12301 · doi:10.1007/BF00929443
[18] van den Broek W., Uncertainty in differential games (2001)
[19] DOI: 10.1023/B:JOTA.0000006690.78564.88 · Zbl 1084.91009 · doi:10.1023/B:JOTA.0000006690.78564.88
[20] DOI: 10.1080/00207721.2012.685200 · Zbl 1307.93177 · doi:10.1080/00207721.2012.685200
[21] DOI: 10.1080/00207721.2015.1022889 · Zbl 1347.93215 · doi:10.1080/00207721.2015.1022889