



Also available at <http://amc-journal.eu>
ISSN 1855-3966 (printed ed.) ISSN 1855-3974 (electronic edn.)
ARS MATHEMATICA CONTEMPORANEA 13 (2017) 187–206

Pursuit-evasion in a two-dimensional domain

Andrew Beveridge*

*Department of Mathematics, Statistics and Computer Science, Macalester College,
Saint Paul, MN 55105*

Yiqing Cai

*The Institute for Mathematics and Its Applications, University of Minnesota,
Minneapolis, MN 55455*

Abstract: In a pursuit-evasion game, a team of pursuers attempt to capture an evader. The players alternate turns, move with equal speed, and have full information about the state of the game. We consider the most restrictive capture condition: a pursuer must become colocated with the evader to win the game. We prove two general results about this adversarial motion planning problem in geometric spaces. First, we show that one pursuer has a winning strategy in any compact $CAT(0)$ space. This complements a result of Alexander, Bishop and Ghrist, who provide a winning strategy for a game with positive capture radius. Second, we consider the game played in a compact domain in Euclidean two-space with piecewise analytic boundary and arbitrary Euler characteristic. We show that three pursuers always have a winning strategy by extending recent work of Bhadauria, Klein, Isler and Suri from polygonal environments to our more general setting.

Keywords: Pursuit-evasion, lion and man, $CAT(0)$ space, motion planning.

Math. Subj. Class.: 91A24, 49N75, 53A04

*E-mail addresses: abeverid@macalester.edu (Andrew Beveridge), yiqingcai@ima.umn.edu (Yiqing Cai)

Dostopno tudi na <http://amc-journal.eu>
ISSN 1855-3966 (tiskana izd.) ISSN 1855-3974 (elektronska izd.)
ARS MATHEMATICA CONTEMPORANEA 13 (2017) 187–206

Izogibanje zasledovanju na dvodimenzionalnem območju

Andrew Beveridge*

*Department of Mathematics, Statistics and Computer Science, Macalester College,
Saint Paul, MN 55105*

Yiqing Cai

*The Institute for Mathematics and Its Applications, University of Minnesota,
Minneapolis, MN 55455*

Povzetek: V igri izogibanja zasledovanju skupina zasledovalcev poskuša ujeti ubežnika. Igralci so izmenično na potezi, premikajo se z enako hitrostjo in imajo popolno informacijo o statusu igre. Obravnavamo najbolj omejujoči pogoj lovljenja: zasledovalec mora zavzeti isti položaj kot ubežnik, da zmaga v igri. Dokažemo dva splošna rezultata v zvezi s tem problemom načrtovanja gibanja nasprotnikov v geometrijskih prostorih. Najprej pokažemo, da ima en zasledovalec zmagovalno strategijo v vsakem kompaktnem $CAT(0)$ prostoru. To dopolnjuje rezultat Alexandra, Bishopa and Ghrista, ki so opisali zmagovalno strategijo za igro s pozitivnim radijem lovljenja. Nato obravnavamo igro, ki se igra na kompaktnem območju v evklidskem dvodimenzionalnem prostoru z odsekoma analitičnim robom in poljubno Eulerjevo karakteristiko. Pokažemo, da trije zasledovalci vselej imajo zmagovalno strategijo, in s tem posplošimo nedavni rezultat, ki so ga podali Bhadauria, Klein, Isler in Suri, s poligonskega okolja na naš splošnejši okvir.

Ključne besede: Izogibanje zasledovanju, lev in človek, $CAT(0)$ prostor, načrtovanje premikanja.

Math. Subj. Class.: 91A24, 49N75, 53A04

**E-poštna naslova:* abeverid@macalester.edu (Andrew Beveridge), yiqingcai@ima.umn.edu (Yiqing Cai)