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DISCRETE TIME ATTACKER-DEFENDER GAME

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Abstract

We analyze a discrete time stochastic attacker-defender game with simultaneous decisions by the attacker and the defender. Actions are not observable, only states of the game, resulting from actions and random factor, are observable. The set of states is finite. Attacker maximizes the probability of hitting the fixed target by his device (e.g., rocket), defender minimizes it. A Markov-Nash equilibrium (a Nash equilibrium in Markov strategies) is the solution concept applied to the game. For each subgame, equilibrium probability of hitting the target is the same in each Markov-Nash equilibrium. When at the time of each decision at least two non-redundant actions are available, reduction of frequency of taking actions by the attacker (defender) increases (decreases) the probability of hitting the target. Thus, it is optimal for the attacker (defender) to take an action only once - in the first (second) period of the game.

Keywords and phrases: attacker-defender game, stochastic game, Markov behavioral strategies, Nash equilibrium.

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