# PURE AND MIXED STATIONARY EQUILIBRIA FOR STOCHASTIC POSITIONAL GAMES

**DMITRII LOZOVANU**
**Institute of Mathematics and Computer Science, Moldova**
**lozovanu@math.md**

***Keywords:*** *Stochastic positional games, Stationary Nash equilibrium, Pure stationary equilibrium, Mixed stationary equiliberium*

We consider a special class of stochastic games with finite state and action spaces that we call stochastic positional games. In a stochastic positional game the set of states is divided into several disjoint subsets such that each subset represents the position set for one of the player and each player control the Markov decision process only in his position set. In such a game each player chooses actions in his position set in order to maximize his payoff. We study this class of games in the cases when the payoffs off the players represent the average reward per transition and in the case when the payoffs of the players represents the expected total discounted total rewards. For each player in his position set are given the set of actions and and the corresponding rewards for the corresponding players for each each chosen action for the corresponding player in his position. We show that for the both cases of the stochastic positional games (the case with average rewards and the case with expected total rewards for the players) there exist stationary Nash equilibria.

The main obtained results for the considered class of games are the following:

- For an arbitrary stochastic positional game with average reward payoffs for the players there exists a Nash equilibrium in mixed stationary strategies; in the case of zero-sum average stochastic game of two players there exist a stationary equilibrium in pure stationary strategies;

- For an arbitrary stochastic positional gamed with expected total reward payoffs for the players there exist a Nash equilibrium in pure stationary strategies. In a more detailed form the presented results can be found in [1, 2]

## References


1. Lozovanu, D.: Stationary Nash equilibria for average stochastic positional games. In: Petrosyan et al (eds) , Frontiers of dynamic games, Static and Dynamic Games Theory: Fondation and Applications, pp. 139-163. Springer, Birkhauser (2018)
2. Lozovanu, D., Pickl, S.: Pure Stationary Nash Equilibria for Discounted Stochastic Positional Games. Contributions to game theory and management, St.Petersburg University, 12, 246–260