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REALIZABLITY OF EXPECTED NASH EQUILIBRIA OF N-PERSON CONDITION GAMES UNDER STRONG KNOWLEDGE SYSTEM

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Abstract. *A knowledge system obtained by adding the greatest entropy criterion, as a common knowledge, to the classical knowledge system (CKS) is called strong knowledge system (SKS). All players are more intelligent under SKS than under CKS. In this paper, we construct an n-person non-cooperative game called n-person condition game and give a method to find its expected Nash equilibria under SKS. Several examples show that, in the same n-person condition game, generally, expected Nash equilibria can easily be found out under SKS and difficultly under CKS, and it is easy for all players to realize an expected Nash equilibrium situation under SKS and difficult to Nash equilibria under CKS.*

Keywords: N-person condition game, Greatest entropy criterion, Strong knowledge system (SKS), Classical knowledge system (CKS), Nash equilibrium, Measurable set, Measurable function

1. **Introduction.** For indeterminacy decision in decision analysis, Jaynes [1,2] put forward the greatest entropy criterion, which can be used to solve subjective probability distribution when one knows some information in a state set. At present, the greatest entropy criterion has been used in a great many fields, such as system model, emulation, artificial intelligence, communication, economics analysis, and so forth.

Generally, a classical static n-person non-cooperative game has at least two Nash equilibria and they are not commutative. Therefore, it is very difficult for all players to want to form a Nash equilibrium situation. Many game theory experts try to decrease Nash equilibria [3] to solve the problem. For example, Schelling [4] put forward the focal point equilibrium theory. And the other one put forward cheap talk theory. But Aumann [5] gave a counterexample to show that it is not necessary that a Nash equilibrium situation occurs even if all the players did a talk beforehand. But there is not a satisfactory result to this problem until now. On the other hand, it is too difficult to compute Nash equilibria,