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CONSTRUCTION OF STRONGLY TIME-CONSISTENT SUBCORES IN DIFFERENTIAL GAMES WITH PRESCRIBED DURATION

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A new strongly time-consistent (dynamically stable) optimality principle is proposed in a cooperative differential game. This is done by constructing a special subset of the core of the game. It is proposed to consider this subset as a new optimality principle. The construction is based on the introduction of a function \hat{V} that dominates the values of the classical characteristic function in coalitions. Suppose that $V(S, \bar{x}(\tau), T - \tau)$ is the value of the classical characteristic function computed in the subgame with initial conditions $\bar{x}(\tau), T - \tau$ on the cooperative trajectory. Define

$$\hat{V}(S; x_0, T - t_0) = \max_{t_0 \leq \tau \leq T} \frac{V(S; x^*(\tau), T - \tau)}{V(N; x^*(\tau), T - \tau)} V(N; x_0, T - t_0).$$

Using this function, we construct an analog of the classical core. It is proved that the constructed core is a subset of the classical core; thus, we can consider it as a new optimality principle. It is proved also that the newly constructed optimality principle is strongly time-consistent.

Keywords: cooperative differential game, strong time consistency, core, subcore, imputation.

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