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Decision-Making Strategies for Pursuers with Speed and Energy Constraints in a Pursuit-Evasion Differential Game

Pursuit-evasion differential games provide a mathematical framework for studying decision-making in dynamic scenarios involving two opposing agents: pursuers and evaders. Governed by differential equations, these games model the strategic decision processes of both sides, with pursuers aiming to capture evaders under specific constraints. This presentation focuses on the development of decision-making strategies for pursuers, particularly when faced with limitations such as speed and energy resources. A key element is the identification of admissible regions—areas where players can make feasible decisions and operate effectively. Additionally, the concept of parallel strategies, where pursuers adapt their decisions in real-time based on the movements of evaders, is explored as a way to enhance the capture process. By examining these decision-making strategies within complex constraints, this analysis provides deeper insights into pursuit-evasion dynamics and offers practical solutions for optimizing real-world applications.