

APPROACHABILITY AND DIFFERENTIAL GAMES

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We develop the links between repeated games and differential games in the framework of approachability. A first result due to N. Vieille (M.O.R., 17, 1992) exhibits the connection between the asymptotic approach in repeated games (limit of finitely repeated or discounted games) and differential games of fixed duration to prove the weak-approachability property. The purpose of the current work is to exhibit a similar relation for the uniform approachability property (robustness of ε -optimal strategies in long games) in repeated games and qualitative differential games. Starting from a repeated game G , we first construct an alternative deterministic repeated game G^* and a related differential game Γ . We then establish an alternative characterization of B-sets in G or G^* as discriminant domains in Γ . We show that a set is $*$ -approachable in G^* iff it contains a B-set. We finally provide a map from winning strategies in the differential game to approachability strategies and thus recover Spinats characterization of approachability (M.O.R., 27, 2002).

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