

Nash Equilibria in certain two-choice multi-player games played on the ladder graph

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We compute analytically the number of Nash Equilibria (NE) for a two-choice game played on a (circular) ladder graph with $2n$ players. We consider a set of games with generic payoff parameters, with the only requirement that a NE occurs if the players choose opposite strategies (anti-coordination game). The results show that for both, the ladder and circular ladder, the number of NE grows exponentially with (half) the number of players n , as $N_{NE}(2n) \sim C(\varphi)^n$, where $\varphi = 1.618\dots$ is the golden ratio and $C_{circ} > C_{ladder}$. In addition, the value of the scaling factor C_{ladder} depends on the value of the payoff parameters. However, that is no longer true for the circular ladder (3-degree graph), that is C_{circ} is constant, which might suggest that the topology of the graph indeed plays an important role for setting the number of NE.