1056-05-1951 Eric Sundberg* (sundberg@oxy.edu), Mathematics Department, 1600 Campus Rd, Los Angeles, CA 90041, and Klay Kruczek (kruczekk@wou.edu), Mathematics Department, 345 North Monmouth Ave, Monmouth, OR 97361. A winning strategy for Maker in the Maker-Breaker version of Tic-Tac-Toe on the integer lattice with numerous winning line directions.
We consider a Tic-Tac-Toe game played on the $d$-dimensional integer lattice. The game that we investigate is a MakerBreaker version of Tic-Tac-Toe. In a Maker-Breaker game, the first player, Maker, only tries to occupy a winning line and the second player, Breaker, only tries to stop Maker from occupying a winning line. We consider the bounded number of directions game, in which we designate a finite set of direction-vectors $\mathcal{S} \subset \mathbb{Z}^{d}$ which determines the set of winning lines. We show that Maker can build winning lines of length up to $(1+o(1)) d \lg k$ if $\mathcal{S}$ is the set of all direction-vectors with coordinates bounded by $k$. We also apply similar methods to the $n$-consecutive lattice points game on the $N^{d}$ board with (essentially) $\mathcal{S}=\mathbb{Z}^{d}$, and we show that the phase transition from a win for Maker to a win for Breaker occurs at $n=(d+o(1)) \lg N$. (Received September 22, 2009)

