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ABSTRACT

This paper addresses the partition problem under the continuous domain in swarm robotics. In this problem, a swarm of n robots, randomly deployed over a rectangular workspace, are required to form K size-balanced groups within a finite amount of time. We aim to look into the problem in the presence of horizontal line obstacles. The obstacles are scattered randomly over the bounded region, and their positions remain unaltered throughout the process. In the proposed solutions, the robots are assumed to be identical, autonomous, and do not have any direct communication among themselves. The robots are memoryless, except they retain only the information of the two parameters n and K throughout the process and their states among three possible ones. Two different partition algorithms are proposed assuming full-compass axis agreement and half-compass axis agreement among the local coordinate systems of the robots. In the first case, the proposed algorithm works for both synchronous and semi-synchronous models, whereas, in the second case, the robots are assumed to be synchronous. As a pre-processing step of the partition algorithms, an assembling algorithm for the half-compass axis agreement model has also been proposed for synchronous and semi-synchronous robots.

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