

# **A computational research on the optimal design for a living system with artificial facilities in desert areas**

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## **Abstract:**

Drifting bodies of sand and lack of water make it difficult for humans to survive in the desert environment. In this paper, a living system is proposed for human survival in the desert, including sand drift prevention facilities (brick arrays), power generation facilities (solar-panel arrays), greenhouses, houses (building arrays), roads, and other basic elements of modern living. The air flow field and sand movement around the brick arrays, solar panel arrays and building arrays were simulated with FLUENT. Analysis of the resulting simulation shows the effect of the sizes and spacing of bricks, panels, and buildings, the placement angle of the panels, and other parameters on the performances of the three types of arrays in fixing and blocking drifting sand. This study suggests that in arranging the configuration of a living system with artificial facilities, the brick arrays should be positioned in the upwind position to prevent sand drift, the building arrays should be positioned in the downwind position, and the panel arrays could be placed near the zone of sand deposition.

Keywords: living system, brick arrays, solar panel arrays, building arrays, wind-sand flow, invasion distance.