

On configuration spaces of k thick particles in a rectangle

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Let Q be a rectangle $[0, a] \times [0, b] \subset \mathbf{R}^2$ with $0 < a \leq b$. and let $F_k(Q, \varepsilon)$ denote *the configuration space of k squares in Q with all sides of the same length 2ε , which do not overlap each other*. We consider 2ε -squares in the rectangle Q as the ε -discs in the *max* norm metric $d(x, y)$. It is allowable that different squares can have common boundary points and the boundaries of squares can intersect the boundary ∂Q along some intervals. Therefore $F_k(Q, \varepsilon)$ consists of ordered k -tuples $(u_1, \dots, u_k) \in Q^k$ such that for any $i, j, i \neq j$, $d(u_i, u_j) \geq 2\varepsilon$ and for each u_i we have $d(u_i, \partial Q) \geq \varepsilon$.

In this work we study critical values of the parameter ε with respect to change of topology of $F_k(Q, \varepsilon)$. In particular, we show that for values of the parameter ε enough small $F_k(Q, \varepsilon)$ is connected. We also discuss the problem for which parameters ε the space $F_k(Q, \varepsilon)$ is aspherical.