Yarovaya E. (Lomonosov Moscow State University, Moscow, Russia). **Branching random walks in homogeneous and non homogeneous branching media**[1]**.** In models of branching random walks (BRWs) on $\mathbf{Z}^d$ with violation of spatial homogeneity and a finite set of sources of particle branching, operators of the following form arise $\mathscr{Y} = \mathscr{A} + \sum_{i=1}^{k} \zeta_i \mathscr{V}_{u_i}\mathscr{A} + \sum_{j=1}^{r} \beta_j \mathscr{V}_{v_j}$, where $\mathscr{A}$ is a bounded self-adjoint operator with spectrum in the interval $(-\infty, 0]$, the non-self-adjoint operator $\mathscr{A} + \sum_{i=1}^{k} \zeta_i \mathscr{V}_{u_i}\mathscr{A}$ is a random walk generator with symmetry breaking at k points, and the finite-dimensional operator $\sum_{j=1}^{r} \beta_j \mathscr{V}_{v_j}$ defines the branching of particles at r points, see, e.g., [1]. Here $\mathscr{V}_z$ denotes the orthogonal projection operator in $l_2(\mathbb{Z}^d)$ on the linear shell of the element δ_z, where δ_z, $z \in \mathbb{Z}^d$, the element of space $l_2(\mathbb{Z}^d)$, defined by the equality $\delta_z(x) = 1$ at $x = z$ and $\delta_z(x) = 0$ at $x \neq z$. Let us estimate the number of positive eigenvalues of the operator $\mathscr{Y}$.

THEOREM *Let the parameters $\{\zeta_i\}$ and $\{\beta_j\}$ in the representation of the operator $\mathscr{Y}$ are real and $\zeta_i > -1$ when $i = 1, 2, \ldots, k$. Let the operator $B = \sum_{j=1}^{r} \beta_j \mathscr{V}_{v_j}$ have n $(0 \leq n \leq r)$ strictly positive eigenvalues. Then the operator $\mathscr{Y}$ can have at most n strictly positive eigenvalues, taking multiplicity into account.*

The obtained result allows us to identify phase transitions in supercritical BRWs.

REFERENCES

[1] Yarovaya E. B., "Branching Random Walks with Several Sources", Mathematical Population Studies, 20, (2013), 14-26.

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