# Applications of some analytic inequalities in obtaining bounds for the resolvent energy of graphs

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Let $M$ be a square matrix of order $n$. The resolvent matrix $\mathcal{R}_M(z)$, of matrix $M$ is defined as $\mathcal{R}_M(z) = (zI_n - M)^{-1}$, where $I_n$ is the unit matrix of order $n$ and $z$ is a complex variable. Let $G$ be a simple graph, and let $A$, $L$, and $Q$ be its adjacency, Laplacian, and signless Laplacian matrix, respectively . Eigenvalues of matrices $A$, $L$ and $Q$ we denote by $\lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_n$, $\mu_1 \geq \mu_2 \geq \cdots \geq \mu_n$ and $q_1 \geq q_2 \geq \cdots \geq q_n$, respectively. We consider resolvent matrices $\mathcal{R}_A(n)$, $\mathcal{R}_L(n+1)$ and $\mathcal{R}_Q(2n-1)$. The resolvent, Laplacian resolvent and signless Laplacian resolvent energy of a graph $G$ are defined as

$$ER(G) = \sum_{i=1}^{n} \frac{1}{n - \lambda_i}, \quad RL(G) = \sum_{i=1}^{n} \frac{1}{(n+1) - \mu_i}, \quad RQ(G) = \sum_{i=1}^{n} \frac{1}{2n - 1 - q_i},$$

respectively. Using analytic inequalities, some lower and upper bounds for these graph invariants are obtained.

## References

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