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# THE THIRD SMALLEST EIGENVALUE OF THE LAPLACIAN MATRIX*

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**Abstract.** Let $G$ be a connected simple graph. The relationship between the third smallest eigenvalue of the Laplacian matrix and the graph structure is explored. For a tree the complete description of the eigenvector corresponding to this eigenvalue is given and some results about the multiplicity of this eigenvalue are given.

**Key words.** Laplacian matrix, algebraic connectivity, third smallest eigenvalue, tree.

**AMS subject classifications.** 05C50, 15A48

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