

# Tree Decomposition By Eigenvectors

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August 26, 2008

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## **Abstract**

In this work a composition-decomposition technique is presented that correlates tree eigenvectors with certain eigenvectors of an associated so-called skeleton forest. In particular, the matching properties of a skeleton determine the multiplicity of the corresponding tree eigenvalue. As an application a characterization of trees that admit eigenspace bases with entries only from the set  $\{0, 1, -1\}$  is presented. Moreover, a result due to Nylen concerned with partitioning eigenvectors of tree pattern matrices is generalized.

**Keywords:** tree, eigenvector, null space, basis, matching

**2000 Mathematics Subject Classification:** Primary 05C05, Secondary 15A03