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Dominique Guillot (dguillot@stanford.edu), **Apoorva Khare*** (khare@stanford.edu) and **Bala Rajaratnam** (brajarat@stanford.edu). *Sparse positive definite matrices, graphs, and absolutely monotonic functions.*

We study the problem of characterizing functions, which when applied entrywise, preserve the set of positive semidefinite matrices with zeroes according to a family $\mathcal{G} = \{G_n\}$ of graphs. This refines previous work (by Rudin, Schoenberg, and others), in which the sole family of all complete graphs $\{K_n : n \in \mathbb{N}\}$ was studied, in terms of absolutely monotonic functions. We obtain novel characterizations for \mathcal{G} an arbitrary collection of trees. We further show that analytic functions preserving positivity on matrices with zeros according to trees, can contain arbitrarily long sequences of negative coefficients, thus obviating the need for absolute monotonicity in a very strong sense. Finally, we find a stronger condition for preserving positivity for any sequence of graphs with unbounded maximal degree, which is only satisfied by absolutely monotonic functions. (Joint with Dominique Guillot and Bala Rajaratnam) (Received September 15, 2014)