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**Dominique Guillot** (dguillot@stanford.edu) and **Bala Rajaratnam\***  
(brajarat@stanford.edu). *Regularization of positive definite matrices: Connections between linear algebra, graph theory, and statistics.*

Positive definite matrices arise naturally in many areas within mathematics and also feature extensively in scientific applications. In modern high-dimensional applications, a common approach to finding sparse positive definite matrices is to threshold their small off-diagonal elements. This thresholding, sometimes referred to as hard-thresholding, sets small elements to zero. Thresholding has the attractive property that the resulting matrices are sparse, and are thus easier to interpret and work with. In many applications, it is often required, and thus implicitly assumed, that thresholded matrices retain positive definiteness. We formally investigate the (linear) algebraic properties of positive definite matrices which are thresholded. We also undertake a detailed study of soft-thresholding, another important technique used in practice. Some interesting and unexpected results will be presented. Finally, we obtain a full characterization of general maps which preserve positivity when applied to off-diagonal elements, thereby extending previous work by Schoenberg and Rudin. (Joint with D. Guillot) (Received September 15, 2014)