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Rekha Thomas* (rrrthomas@u.washington.edu), Box 354350, Department of Mathematics, University of Washington, Seattle, WA 98195, and **Joao Gouveia** and **Pablo Parrilo**. *Theta bodies for Polynomial Ideals*.

We extend Lovasz's construction of the theta body of a graph to create a hierarchy of semidefinite relaxations for the convex hull of any real variety. These relaxations tie into the literature via work by Lasserre. When the variety is finite, i.e., the convex hull is a polytope, we give a complete characterization of when the first theta body equals the polytope, answering partially a question by Lovasz. For all varieties, the first theta body has a precise geometric description that I will describe. Joint work with Joao Gouveia and Pablo Parrilo. (Received February 13, 2009)