On hypergraph cliques and polynomial programming

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Motzkin and Straus established a close connection between the maximum clique problem and a solution (namely graph-Lagrangians) to the maximum value of a class of homogeneous quadratic multilinear functions over the standard simplex of the Euclidean space in 1965. This connection provides a new proof of Turán’s theorem. Recently, an extension of Motzkin-Straus theorem was proved for non-uniform hypergraphs whose edges contain 1 or 2 vertices in a paper by Peng, Peng, Tang, and Zhao. It is interesting if similar results hold for other non-uniform hypergraphs. In this talk, we give some connection between polynomial programming and the clique of non-uniform hypergraphs whose edges contain 1, or 2, and more vertices. Specifically, we obtain some Motzkin-Straus type results in terms of the graph-Lagrangian of non-uniform hypergraphs whose edges contain 1, or 2, and more vertices.

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