

**Alizadeh, Farid; Haerberly, Jean-Pierre A.; Overton, Michael L.**

**Complementarity and nondegeneracy in semidefinite programming.** (English) Zbl 0890.90141  
Math. Program. 77, No. 2 (B), 111-128 (1997).

Summary: Primal and dual nondegeneracy conditions are defined for semidefinite programming. Given the existence of primal and dual solutions, it is shown that primal nondegeneracy implies a unique dual solution and that dual nondegeneracy implies a unique primal solution. The converses hold if strict complementarity is assumed. Primal and dual nondegeneracy assumptions do not imply strict complementarity, as they do in LP. The primal and dual nondegeneracy assumptions imply a range of possible ranks for primal and dual solutions  $X$  and  $Z$ . This is in contrast with LP where nondegeneracy assumptions exactly determine the number of variables which are zero. It is shown that primal and dual nondegeneracy and strict complementarity all hold generically. Numerical experiments suggest probability distributions for the ranks of  $X$  and  $Z$  which are consistent with the nondegeneracy conditions.

**MSC:**

[90C05](#) Linear programming

Cited in **2** Reviews  
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**Keywords:**

[nondegeneracy conditions](#); [semidefinite programming](#)