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**A generating set search approach to nonlinear  
programming problems using an augmented Lagrangian  
method with explicit treatment of linear constraints**

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We consider solving nonlinear programming problems using an augmented Lagrangian method that makes use of derivative-free generating set search to solve the subproblems. Our approach is based on the augmented Lagrangian framework of Andreani, Birgin, Martínez, and Schuverdt which allows one to partition the set of constraints so that one subset can be left explicit, and thus treated directly when solving the subproblems, while the remaining constraints are incorporated in the augmented Lagrangian. Our goal in this paper is to show that using a generating set search method for solving problems with linear constraints, we can solve the linearly constrained subproblems with sufficient accuracy to satisfy the analytic requirements of the general framework, even though we do not have explicit recourse to the gradient of the augmented Lagrangian function. Thus we inherit the analytical features of the original approach (global convergence and bounded penalty parameters) while making use of our ability to solve linearly constrained problems effectively using generating set search methods. We need no assumption of nondegeneracy for the linear constraints. Furthermore, our preliminary numerical results demonstrate the benefits of treating the linear constraints directly, rather than folding them into the augmented Lagrangian.