

**THE NONLINEAR AND AUGMENTED LAGRANGIANS FOR
NONCONVEX OPTIMIZATION PROBLEMS WITH A SINGLE
CONSTRAINT**

ALEX M. RUBINOV AND RAFAIL N. GASIMOV

ABSTRACT. The paper contains the survey of some recent results obtained by the authors and their colleagues. We study zero duality gap properties for optimization problems with a single constraint with respect to a nonlinear penalization. The penalty function is constructed as a convolution of the objective function and the constraint by means of IPH (increasing positively homogeneous) functions. The main results are obtained for penalization by strictly IPH functions. We also examine augmented Lagrangians for optimization problems with a single constraint. We establish some links between augmented Lagrangians and Lagrange-type functions and propose a new kind of Lagrange-type functions for the problems with a single inequality constraint.