

# **A Flexible Inexact Restoration Method and Application to Multiobjective Constrained Optimization**

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We introduce a new flexible Inexact-Restoration (IR) algorithm and an application to Multiobjective Constrained Optimization Problems (MCOP) under the weighted-sum scalarization approach. In IR methods each iteration has two phases. In the first phase one aims to improve feasibility and, in the second phase, one minimizes a suitable objective function. In the second phase we also impose bounded deterioration of the feasibility obtained in the first phase. Here we combine the basic ideas of the Fischer-Friedlander approach for IR with the use of approximations of the Lagrange multipliers. We present a new option to obtain a range of search directions in the optimization phase and we employ the sharp Lagrangian as merit function. Furthermore, we introduce a flexible way to handle sufficient decrease requirements and an efficient way to deal with the penalty parameter. We show that with the IR framework there is a natural way to explore the structure of the MCOP in both IR phases. Global convergence of the proposed IR method is proved and examples of the numerical behavior of the algorithm are reported.