

**SPLITTING METHODS FOR CONSTRUCTING
THE RESOLVENT OF A SUM OF
MAXIMAL MONOTONE OPERATORS**

Patrick Combettes

University of Paris VI

We propose two inexact parallel splitting algorithms for computing the resolvent of a weighted sum of maximal monotone operators in a Hilbert space and show their strong convergence. We start by establishing new results on the asymptotic behavior of the Douglas-Rachford splitting algorithm for the sum of two operators. These results serve as a basis for the first algorithm. The second algorithm is based on an extension of a recent Dykstra-like method for computing the resolvent of the sum of two maximal monotone operators. Under standard qualification conditions, these two algorithms provide a means for computing the proximity operator of a weighted sum of lower semicontinuous convex functions. We show that a version of the second algorithm performs the same task without requiring any qualification condition. In turn, this provides a parallel splitting algorithm for qualification-free strongly convex programming.