Proceedings of SPIE 2440, pp.192-206 (1995)

OPTIMASK: An OPC algorithm for Chrome and Phase-Shift Mask Design

Eytan Barouch, Uwe Hollrbach, and Rakesh Vallishayee
Vector Technologies, Inc.
4400 East-West Hwy, Suite 705, Bethesda, MD 20814
On leave of absence from
Dept. of Mathematics and Computer Science
Clarkson University, Potsdam, NY 13699

Applied and Computational Mathematics
Princeton University, Princeton, NJ 08544-1000

ABSTRACT

A mask correction algorithm (OPTIMASK) has been designed and implemented. Its main ingredients are optical proximity correction (OPC) and optical design rule checker (ODRC). The algorithm is based on the lithographic notion that a mask has to print throughout its defocus budget, taking into account multiple defocus planes. In each defocus plane the aerial image is computed using FAIM, and the design failures are reported via ODRC. The mask correction is subjected to physical restrictions that do not allow *any feature couplings to occur. The union of the failures at all defocus values determines the first step taken in correcting the mask. Then a (constrained) Newton optimization scheme is applied to optimize line shrinkage, linewidth control, and corner rounding errors. All the tools needed to optimize a specific layer within a particular cell and return the optimized layer to the original mask file have been implemented. Several examples will be shown.*