which simulate the ants behavior, walking around the graph representing the problem to solve using mechanisms of cooperation and adaptation.
The novelty in this paper is the use of intuitionistic fuzzy estimations of start nodes with respect to the quality of the solution and thus to better menage the search process. Intuitionistic logic or constructive logic is a symbolic logic. In this logic any statement can be truth, false or uncertainty. The main is that truth plus false can not be equal to one. On the basis of the estimations we offer several start strategies and their combinations. Like a benchmark problem is used Multiple Knapsack Problem (MKP), which is a representative of the class of subset problems. A lot of real world problems can be represented by it more over MKP arises like a subproblem in many optimization problems.

A Monte Carlo Simulator for Non-Contact Atomic Force Microscopy

L. Filipović, M. Nedjalkov, S. Selberherr

Modern lithographic methods are reaching the edge of their potential and nano-lithography using Atomic Force Microscopy (AFM) is a promising alternative for the manufacture of nanometer-sized devices. It is critically important to be able to properly model silicon surface deformations due to AFM, since simulating processing steps and the resulting features gives clues to the devices that can be manufactured using this method. Various publications suggest that surface deformations due to AFM have a Gaussian or Lorentzian profile. Analytical models which show deformations with such profiles are implemented in available AFM Monte Carlo (MC) simulators. We explore an alternative to such compact models by developing a physics-based MC model, where the AFM tip is treated as a point charge and the silicon wafer as an infinite metal plane, shown in Figure 1. The strength of the generated electric field creates O^- particles from the air ambient. The presented physics-based model generates a desired number of O^- particles, whose distribution in the ambient depends

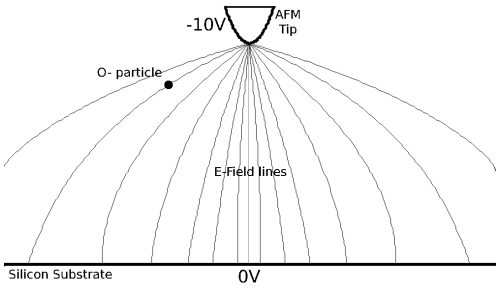

Figure 1: Sample electric field lines from the AFM tip.

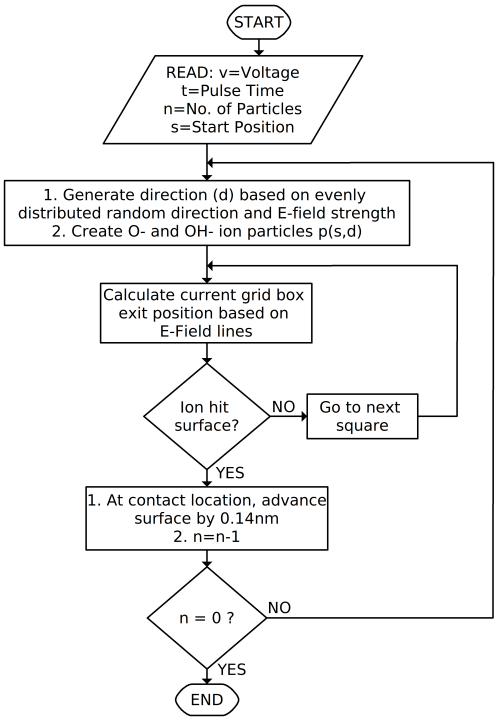

Figure 2: Flow chart for the proposed physics-based model.

on the strength of the electric field. The particles are then accelerated towards the silicon surface, where each collision with the silicon wafer generates a small growth on the surface. The flow chart of the proposed model is shown in Figure 2.
The principal aim of our research is to create a physics-based MC model in order to explore the validity of available analytical models and to predict the final shape of a silicon wafer after applying AFM nano-lithographic processing steps.

Reachable Sets of Impulsive Control System with Cone Constraint on the Control and their Estimates

T. F. Filippova, O. G. Matviychuk

The paper deals with the problems of control and state estimation for a linear impulsive control system

$$dx = A(t)xdt + B(t)du, \quad x(t_0 - 0) \in X_0, \quad t_0 \leq t \leq T \tag{1}$$

with $X_0 = \{x \in R^n \mid (x - x_0)' M_0 (x - x_0) \leq 1\}$ being an ellipsoid in R^n where a center