SYNTHESIS OF TRANSISTOR- CHAINING ALGORITHM FOR CMOS CELL LAYOUT USING BIPARTITE GRAPH

Thesis presented in partial fulfillment for the award of the
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Abstract

This project implement a algorithm for the optimal transistor chaining problem in CMOS functional cell layout based on Uehara and vanCleemput's layout style [1] which assumed that the height of each logic module layout is constant and performed the optimisation by decomposing the graph module into a minimum number of sub graph having a dual Euler (d-Euler) trail The algorithm takes a transistor level circuit schematic and the outputs a minimum set of chains Searching for possible abutment between the transistor pairs are modelled as a bipartite graph A depth - first search algorithm is used to search for optimal chaining Theorems on number of branches needed to be explored at each node of search tree are derived A theoretical lower bound on the size of the chain set is derived This bound enables us to prune the search tree efficiently The algorithm will be implemented and tested in this project using C language The result will be compared with euler's path algorithm using heuristic search and a pseudo input to find the minimum interlace

keywords - CMOS cell layout, optimal chaining, depth-first search.

1.0 *Introduction*

As the CMOS VLSI technology [2] and the cell based layout methodology [3][4] get popular, the automatic layout generation of a CMOS function cell becomes very important and attracts attentions from many VLSI/ CAD researches

In this report, it is proposed that a fast algorithm for the problem of chaining the transistor pairs using minimum number of chains Input to the algorithm is a CMOS schematic circuit which has equal number of P-type and N-type transistor at transistor level Output from the algorithm is a minimum set of chain can be realised using only one P-type diffusion strip and N-type diffusion strip once

By grouping the transistors into pairs with each pair consisting a type and N-type transistor and then model the possible abutments between the pairs using a bipartite graph On the graph, a depth-first search algorithm is used to find a maximum set of edges which correspond to a maximum number of realisable abutments. A tight upper bound on the number of realisable abutments, hence, the lower bound on the number of chains needed, for an optimal solution is derived.