An Integer Linear Programming Approach to Full-Custom VLSI Incremental Floorplanning

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ABSTRACT

Floorplanning is one of the most important stages in physical design. It is difficult to obtain an optimal floorplanning result due to the increasing complexity in electronic circuit systems. Therefore, to obtain a better solution, it is possible to repeatedly perform the floorplanning procedure. However, this will take more time for circuit layout. For shortening the whole floorplanning process, incremental floorplanning strategy has hence been proposed for quickly reperforming floorplanning when the floorplan has some small changes. In this thesis, an incremental floorplanning system based on mathematical programming has been proposed to guide physical design towards an optimal layout solution. The incremental floorplanning problem is a two-dimensional optimization problem which has been transformed into several one-dimensional subproblems in our research. Each subproblem can then be solved by integer linear programming technique. The multi-objective function of the linear programming formulation, which being subject to several constraints, is designed to simultaneously consider changing module size, preserving available whitespace, and controlling interconnection length. The final floorplan is obtained by performing the integer linear programming formulation without the change of topology among modules and without the increase of chip size. The integer linear programming formulation has been solved by LINGO software. Experimental results show that it is effective for the proposed incremental floorplanning system to change module dimensions and control interconnection length.

Keywords : incremental floorplanning、mathematical programming

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