Obstacle-aware multiple-source rectilinear Steiner tree with electromigration and IR-drop avoidance

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Abstract

Based on the width determination of any current-driven connection for electromigration and IR-drop avoidance, an area-driven multiple-source routing tree can be firstly constructed to minimize the total wiring area with satisfying the current flow in Kirchhoff's current laws and the electromigration and IR-drop constraints. Furthermore, some Steiner points can be assigned onto feasible locations to reduce the total wiring area under the electromigration and IR-drop constraints. Finally, an obstacle-aware multiple-source rectilinear Steiner tree can be constructed by assigning the obstacle-aware minimum-length physical paths for all the connections. Compared with Lienig's multiple-source Steiner tree[7], the experimental results show that our proposed approach without any IR-drop constraint can reduce 10.5% of the total wiring area. Under 10%Vdd and 5%Vdd IR-drop constraints, the experimental results show that our proposed approach can satisfy 100% electromigration and IR-drop constraints and reduce 7.5% and 4.9% of the original total wiring area on the average for tested examples, respectively.

Keyword：Steiner tree, Electromigration, IR-drop