

Abstract

Multi-Threshold CMOS (MTCMOS) is a circuit style that can effectively reduce leakage power consumption. Sleep transistor sizing is the key issue when MTCMOS circuit is designed. If the sleep transistor size is too large, the circuit performance can be maintained but the dynamic power consumption of the sleep transistor will increase. On the other hand, if the sleep transistor size is too small, there will be significant performance degradation because of the increased resistance to ground. Previous approach [9, 10] designed the sleep transistor size based on mutual exclusive discharge patterns. However, these approaches considered only topology of a circuit. We observed that two possible simultaneous switching gates may not discharge at the same time in terms of functionality. Thus, we propose an algorithm to determine how to cluster cells to share sleep transistors taking both topology and functionality into consideration. The results show that the proposed method can achieve on the average 18% reduction ratio in terms of the number of sleep transistors as compared to the method without considering functionality.