

Chapter 8

Conclusions



In this book, we presented the basic principles of applying so-called “machine learning” in model order reduction and highlighted the key benefits. One of the major research areas in CAD is circuit simulation. Circuit simulation is to use mathematical models to predict the behavior of an electronic circuit. A circuit is usually represented by a set of partial differential equations (PDEs) or ordinary differential equations (ODEs). So, the circuit simulation actually involves solving large-scale ODEs which sometimes takes several days or even weeks. Therefore, fast and accurate circuit simulation algorithms are needed to accelerate the simulation cycle. One way to speedup the simulation is to approximate the original system with an appropriately simplified system which captures the main properties of the original one. This method is called model order reduction (MOR), which reduces the complexity of the original large system and generates a reduced-order model (ROM) to represent the original one. This book presented novel MOR techniques based on machine learning such as genetic algorithm, neural network, simulated annealing, fuzzy logic, particle swarm optimization, and ant/bee colony. This book compared different approaches for model order reduction. In addition, hybrid solutions are presented. Finally, new directions in machine learning are discussed.