



Extracting the Characteristics of Circuits

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ABSTRACT In this work, the large static characteristics of a circuit is extracted automatically from DAE modeling procedures. Because to different circuits correspond different characteristics, we offered three methods from which we can choose. Also, some significant parameters in the modeling approach are calculated automatically.

BACKGROUND DAE Modeling approach is used to generate a behavioral model of a circuit. It starts from a real circuit, first determines its signal path nodes, and then calculates its poles and zeros. It uses an algorithm called root localization to calculate root sensitivities and it determines which roots should be modeled by which methods. At last, it determines additional important nodes for inclusion in the model based on large-signal dynamic and topological considerations. After that, a model topology is formulated and differential equations of the behavioral model are generated. The characteristics of a circuit are extracted based on the real circuit, and the corresponding parameters are computed automatically. The accuracy of the generated behavioral model depends on the model topology and the extracted data tables of the characteristics. Based on testing results, there is dilemma with the data tables: accuracy vs. data table size. If we choose a very small step size, the accuracy is improved, but the size of data tables is enlarged and the time needed to obtain the data

tables is increased. So, evidently there is a tradeoff between accuracy and data table size.

There are three methods offered to the user to determine the step sizes. They are: Equal Space, Three Region and Sigmoid. After allowing the user to choose one of these different methods, and set certain parameters, we obtain a group of optimized data tables.

WORK DONE The code for extracting characteristics of circuits and calculating parameters of behavioral model has been completed.

RESULTS By testing the behavioral model generated by using DAE modeling tools, we know the methods of extracting circuit characteristics are effective to obtain a group of data tables with reasonable accuracy and sizes.

FUTURE WORK The procedure of optimizing the characteristic extraction still needs further study. The purpose of this work is to focus on how to improve the accuracy of the characteristics and decrease the size of data tables. Currently, we are trying to use Neural Network to replace the data tables. My future work will be concentrated on exploring a way that can express the behavioral model in a more general, more accurate, more controllable and more understandable manner.