

Dynamic Analysis of Switching-Mode DC/DC Converters (Electrical Engineering)

By Andre Kislovski



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The most critical part of the modern switching-mode power supply is the regulated dc/dc converter. Its dynamic behavior directly determines or influences four of the important characteristics of the power supply: • Stability of the feedback loop • Rejection of input-voltage ripple and the closely-related transient re sponse to input-voltage perturbation • Output impedance and the closelyrelated transient response to load perturbation • Compatibility with the input EMI filter Due to the complexity of the operation of the converter, predicting its dynamic behavior has not been easy. Without accurate prediction, and depending only on building the circuit and tinkering with it until the operation is satisfactory, the engineering cost can easily escalate and schedules can be missed. The situation is not much better when the circuit is built in the computer, using a general-purpose circuit-simulation program such as SPICE. (At the end of this book is a form for obtaining information on a computer program especially well suited for dynamic analysis of switching-mode power converters: DYANA, an acronym for "DYnamic ANAlysis." DYANA is based on the method given in this book.) The main goal of this book is to help the powersupply designer in the prediction of the dynamic behavior by providing userfriendly analytical tools, concrete results of already-made analyses, tabulated for easy application by the reader, and examples of how to apply the tools provided in the book.

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