

## Preface

This book presents a treatise of the current injection methods applied in three-phase diode bridge rectifiers to reduce the harmonic content of the input currents. The material presented in the book is a result of a decade of research in the area. Some of the results were published in a shorter form in a number of journals, and previously presented at several conferences. However, the book is not a collection of papers. Writing a book was an opportunity to present the results in a more readable form, with all of the necessary derivations and explanations. In addition, some of the results presented in the book were written several years after the research was done and the initial results were obtained, which provided some time to judge them and to make corrections. The book also contains some new results, never previously published, primarily in Chapter 13 that treats current injection versions of 12-pulse rectifiers, but new material can be found in other chapters of the book as well. A special chapter that deals with current injection devices is included in the book, and this important topic was previously only casually mentioned in the research papers. All of the results are presented in a uniform style that should provide an easier comparison of the methods. This book should be helpful for researchers in the area, as well as for the practicing engineers who are interested in applying the current injection methods.

The complex math that underlines current injection methods results in simple rectifiers, which consist of a moderate number of elements. Reduction of the input current harmonics is always obtained at a cost. Thus, unless there are regulations that limit the input current harmonics, devices that apply this reduction are infrequent. Current injection based rectifiers qualify as an attractive choice to meet the regulations and/or to resolve the



power quality problems since they are simple and robust. The rectifier topologies proposed and analyzed in this book meet the harmonic regulations and are readily waiting for the regulations to arrive.

The current injection methods have an oscillating history. To the best of my knowledge, the first ideas regarding current injection date back to 1954. Just after their invention, the methods had been forgotten until the late 1960s and the beginning of the 1970s. The next outburst of research results occurred in the mid-1980s, followed by several years of reduced activity. Finally, starting from the 1990s, the current injection methods have been continuously a topic of interest to researchers.

I wish to express my sincere thanks to many people who contributed to this book. The first is a colleague who initiated my research in the area. Next are many colleagues who contributed to my research through inspiring discussions. Then, there are students who asked many relevant questions and forced me to provide better explanations and to improve my arguments. Many thanks are due to a colleague who suggested I publish this book. Finally, the editorial staff significantly improved this book and deserves sincere appreciation for their efforts. An attempt to name all of these people would inevitably result in an incomplete list and would be unfair to those excluded. However, without all of these people, this book would not appear in its present form. I would also like to thank the IEEE and the IET for granting the copyright permissions.



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