

## Generalized Mathematical Description and Simulation of Grid-Tied Thyristor Converters

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**Abstract :** Thyristor rectifiers, inverters grid-tied, and AC voltage regulators are widely used in industry, and on electrified transport, they have a lot in common both in the power circuit and in the control system. They have a common mathematical structure and switching processes. At the same time, the rectifier, but the inverter units and thyristor regulators of alternating voltage are considered separately both theoretically and practically. They are written about in different books as completely different devices. The aim of this work is to combine them into one class based on the unity of the equations describing electromagnetic processes, and then, to show this unity on the mathematical model and experimental setup. Based on research from mathematics to the product, a conclusion is made about the methodology for the rapid conduct of research and experimental design work, preparation for production and serial production of converters with a unified bundle. In recent years, there has been a transition from thyristor circuits and transistor in modular design. Showing the example of thyristor rectifiers and AC voltage regulators, we can conclude that there is a unity of mathematical structures and grid-tied thyristor converters.

**Keywords :** direct current, alternating current, rectifier, AC voltage regulator, generalized mathematical model

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