

Abstract

In this paper, a small-signal linearized model based on the state space averaging method is proposed for a particular three-phase unity power factor AC/DC converter known as the Vienna rectifier. The resulting model is a MIMO linear model. In order to control the system, two control strategies have been developed. The first one is based on a decoupling procedure and the second one is a straightforward looping method. The expected results of the proposed model and the related control strategies are in good accordance with their counterpart using a nonlinear MIMO model and a feedback linearization control as reported in the literature, with the main advantage of being easier to implement. Simulation results are also provided in order to validate the theoretical approach carried out through the paper.

Key Words: Vienna rectifier, unity power factor, dynamic modeling, state-space averaging technique, multi-loop control strategy.