Level doubling network and ripple correlation control MPPT algorithm for grid-connected photovoltaic systems. Doctoral thesis accepted by the University of Bologna, Bologna, Italy

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Abstrak

This book describes an original improvement in power quality of photovoltaic generation systems obtained by the use of a multilevel inverter implemented with level doubling network (LDN). Modulation principles and harmonic analysis of output voltages are proposed and introduced in detail for both single and three-phase LDN configurations. The analysis is then extended to dc-link current and voltage, with emphasis to low-frequency harmonics and switching frequency ripple. This work represents the first comprehensive implementation of maximum power point tracking (MPPT) schemes using the ripple correlation control (RCC) algorithm in the presence of multiple ripple harmonics, such as in the case of multi-level inverters. Numerical simulations and experimental tests are carefully reported here, together with practical insights into the design of dc-link capacitors.