

The purpose of this paper is to develop a control and regulation method of input DC voltages of five-level Neutral Point Clamping (NPC) Active Power Filter (APF). This APF is applied for the enhancement of medium voltage network power quality by compensation of harmonic currents produced by an induction motor speed variator. In the first part, the authors present a topology of five-level NPC Voltage Source Inverter (VSI), and its simplified Space Vector Pulse Width Modulation (SVPWM) control strategy. In the second part, the control strategy of Three-level PWM current rectifier is presented. In the third part, to remedy to instability problem of the input DC voltages of the APF, the authors propose the feedback control of the three-level rectifier associated with a simplified SVPWM with redundant vectors method of five-level APF. After that, the sliding mode regulator used to control the APF is developed. The application of the proposed control algorithm offers the possibility of stabilizing the DC voltages of APF. Stable DC bus supply associated with sliding regulator of APF allows getting low-harmonic content network currents with unity power factor. In all over, the instability problem associated with use of multilevel APF is solved. The obtained results are full of promise to use the multilevel APF in medium voltage and great power applications