

The flying capacitor multilevel inverter (FCMLI) is one of the well-known structures of multilevel inverters having attracted considerable attention because of its merits. In spite of its many advantages, it has some limitations such as high volume and complicated control method because of its bulky capacitors and their voltage balancing requirement. Moreover, the high number of power semiconductors required makes this structure susceptible to failure. To increase the ratio of the number of levels to the number of components, an uneven distribution of capacitor voltages has been suggested in previous reports; however, this approach complicates the control method. Up to now, almost all presented methods suffer from high computational load and/or structure-dependent algorithm. In this paper, a simple state-based and structure-independent method is proposed for capacitor voltage regulation. The proposed method is straightforward and can perform online computation of switching sequences in a computationally efficient manner without any need for stored information or look-up tables. The method is conveniently extendible to any number of cells and levels in an FCMLI structure with arbitrary dc link voltage distribution schemes. Simulation and experimental results show the effectiveness and simplicity of this method.