

This paper proposes a hybrid modulation method for a dual-output five-leg indirect matrix converter topology. The proposed control technique combines a space vector modulation scheme (SVPWM) applied to the rectifier stage so as to control the input currents and a new digital scalar modulation scheme (DSPWM) designed to control the two loads output voltages. A generalized expression of the output voltage references is also developed showing the capability of the proposed method to control more than two independent loads without requiring additional mathematical development. Furthermore, a new modified expression of the output voltages references is proposed to enable the correct operation of the converter under unbalanced grid voltages. Also, this paper proposes a detailed mathematical analysis that allows evaluating the effect of output loads unbalances on the input current harmonic content. Simulation and experimental results are provided to show the effectiveness of the proposed theoretical investigations and confirm the capability of the proposed method to control multiple drive systems as well as ac input currents.