APPENDIX 12A VOLTAGE SPACE VECTOR PULSE WIDTH MODULATION

The sinusoidal-PWM is near ideal, except it does not utilize the available dc-link voltage to its fullest. A modified PWM technique called the space vector PWM (SV-PWM) can produce from the same dc-link voltage a three-phase output voltage that is higher by approximately fifteen percent. This is accomplished by injecting a zero-sequence voltage v_k by modifying the control voltages as follows:

$$\begin{aligned} \frac{v_{c,A}}{\hat{V}_{tri}} &= \frac{v_A - v_k}{V_d/2} \\ \frac{v_{c,B}}{\hat{V}_{tri}} &= \frac{v_B - v_k}{V_d/2} \\ \frac{v_{c,C}}{\hat{V}_{tri}} &= \frac{v_C - v_k}{V_d/2} \end{aligned} \tag{12-1}$$

where,

$$v_k = \frac{\max(\overline{v}_{An}, \overline{v}_{Bn}, \overline{v}_{Cn}) + \min(\overline{v}_{An}, \overline{v}_{Bn}, \overline{v}_{Cn})}{2} \tag{12-2}$$

Discussion of these equations can be found in the following reference:

1. N. Mohan, Advanced *Electric Drives: Analysis, Modeling and Simulation using Simulink*, year 2001 Edition, MNPERE, Minneapolis, www.MNPERE.com.