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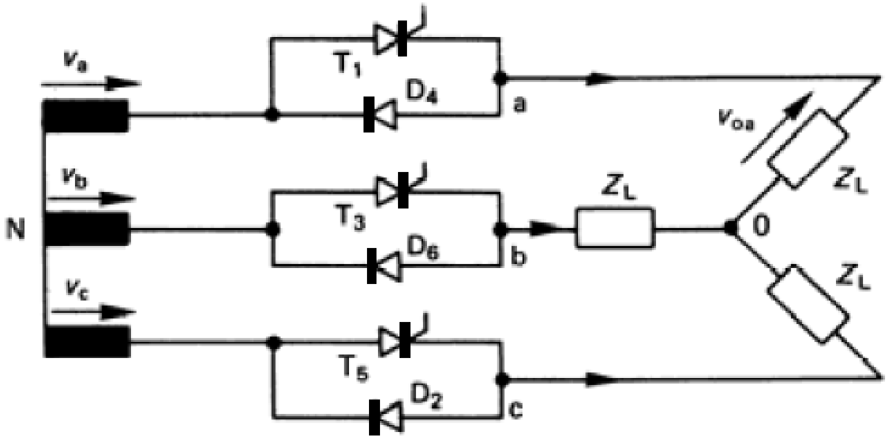
1- 3 phase Half Wave AC Voltage Controller with R load



The expressions for RMS load phase voltage with resistive load are:

$$V_o = V_S\sqrt{\left\{1-\frac{3\alpha}{4\pi}+\frac{3}{8\pi}\sin 2\alpha\right\}} \quad \ldots\ldots\ldots\ldots \quad 0 \le \alpha \le 90$$

$$V_o = V_S\sqrt{\left\{\frac{11}{8}-\frac{3\alpha}{2\pi}\right\}} \quad \ldots\ldots\ldots\ldots \quad 90 \le \alpha \le 120$$

$$V_o = V_S\sqrt{\left\{\frac{7}{8}-\frac{3\alpha}{4\pi}+\frac{3}{16\pi}\sin 2\alpha-\frac{3\sqrt{3}}{16\pi}\cos 2\alpha\right\}} \quad \ldots\ldots\ldots\ldots \quad 120 \le \alpha \le 210$$

$$V_o = 0 \quad \ldots\ldots\ldots\ldots \quad \alpha \ge 210$$

Where V_s is the rms of the supply phase voltage

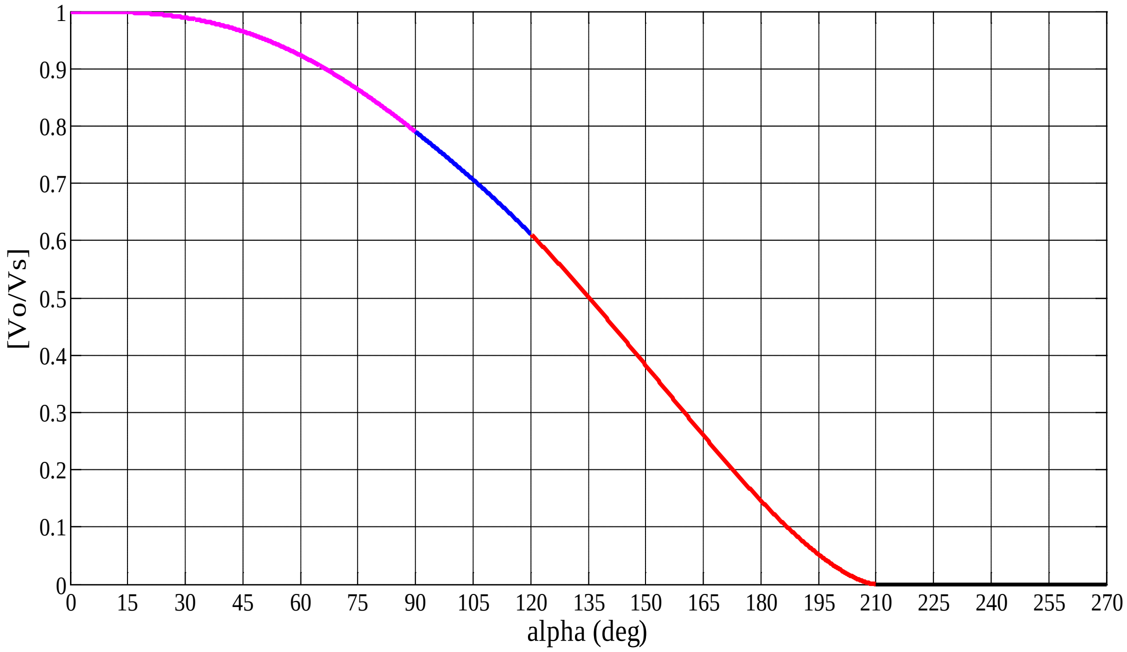
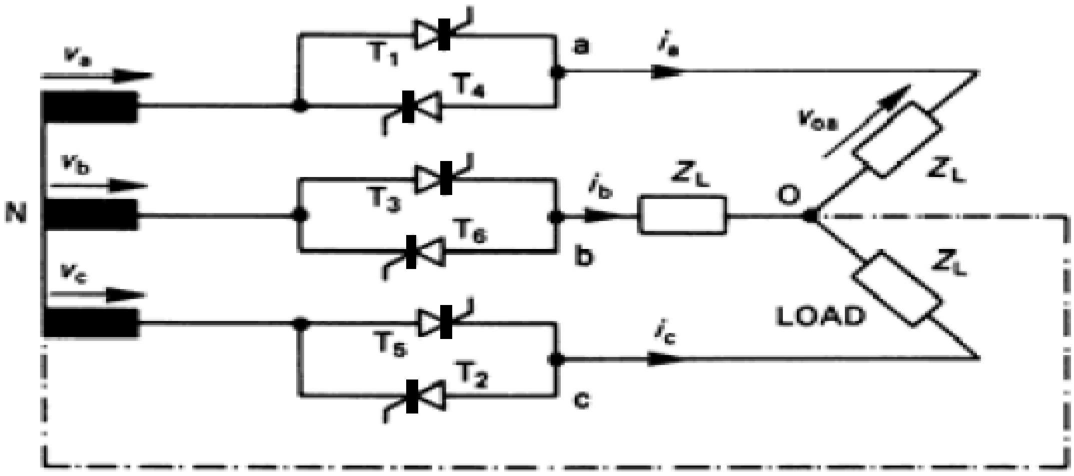


Fig. (1): [Vo/Vs] versus [firing angle] for a Y- connected resistive load in 3-ph Half Wave AC Voltage Controller

2- 3 phase Full Wave AC Voltage Controller with R load



The expressions for RMS load phase voltage with resistive load are:

$$V_O = V_S\sqrt{\left\{1 - \frac{3\alpha}{2\pi} + \frac{3}{4\pi}\sin 2\alpha\right\}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 0 \le \alpha \le 60$$

$$V_O = V_S\sqrt{\left\{\frac{1}{2} + \frac{9}{8\pi}\sin 2\alpha + \frac{3\sqrt{3}}{8\pi}\cos 2\alpha\right\}} \quad \ldots\ldots\ldots\ldots \quad 60 \le \alpha \le 90$$

$$V_O = V_S\sqrt{\left\{\frac{5}{4} - \frac{3\alpha}{2\pi} + \frac{3}{8\pi}\sin 2\alpha + \frac{3\sqrt{3}}{8\pi}\cos 2\alpha\right\}} \quad \ldots\ldots\ldots \quad 90 \le \alpha \le 150$$

$$V_O = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \alpha \ge 150$$

Where V_s is the rms of the supply phase voltage

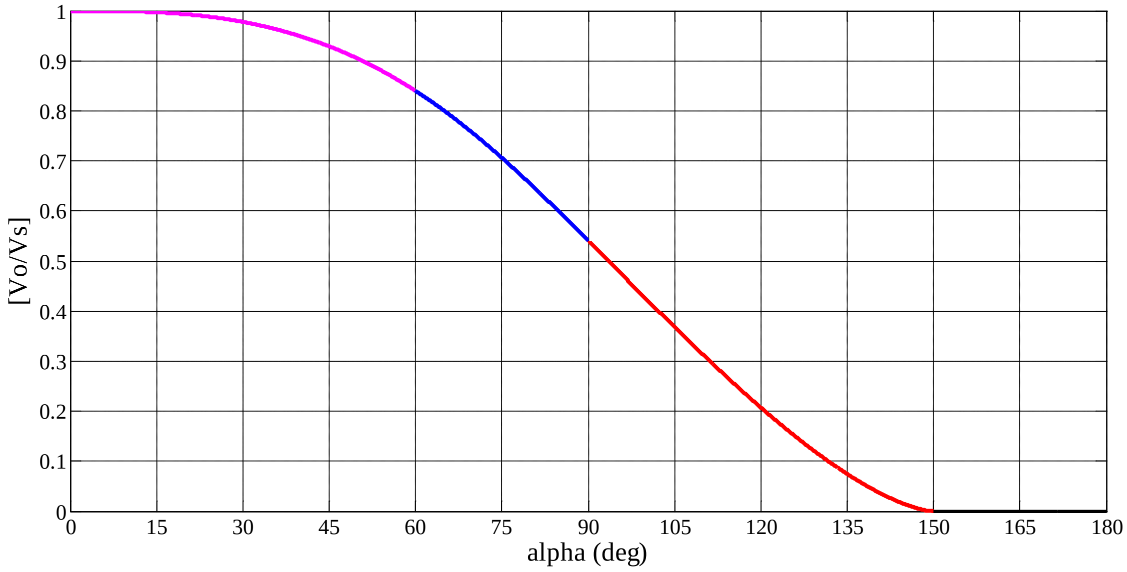
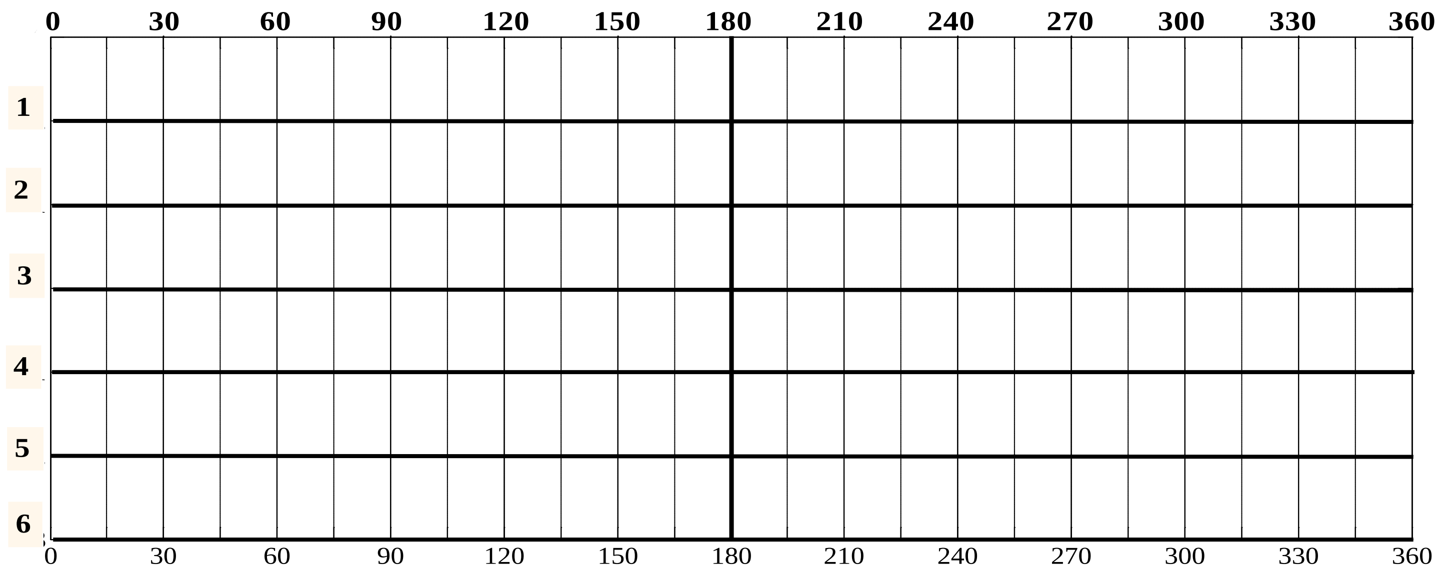
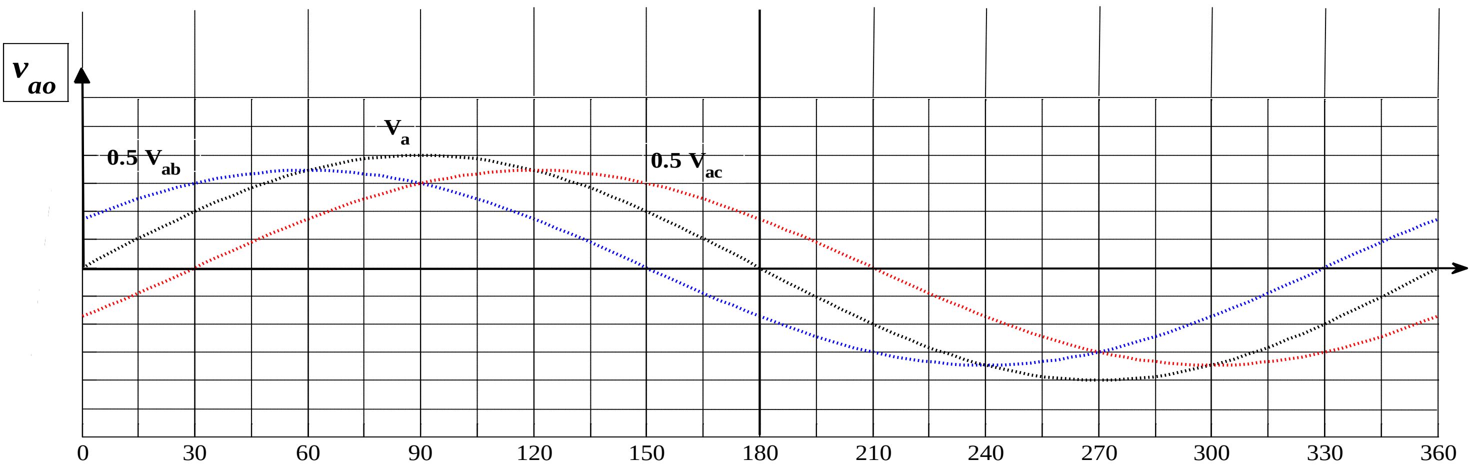


Fig. (2): [Vo/Vs] versus [firing angle] for a Y- connected resistive load in 3-ph Full Wave AC Voltage Controller


0 30 60 90 120 150 180 210 240 270 300 330 360
1
2
3
4
5
6
0 30 60 90 120 150 180 210 240 270 300 330 360


v_{ao}
V_a
$0.5\ V_{ab}$
$0.5\ V_{ac}$
0 30 60 90 120 150 180 210 240 270 300 330 360