A negative overshoot at the end of the gate pulse is generally to be avoided since in some circumstances it may tend to turn-off the anode current that has been initiated in the thyristor.

3.2.4 Spurious Triggering

Spurious triggering, whether through stray pick-up on the gate in the firing control circuit, through excessive anode voltage or dv/dt in the main circuit, can damage a thyristor directly, apart from the possibility of indirect damage through a resulting malfunction of the circuit. This is so because the thyristor so triggered may not have the di/dt capability to withstand the anode circuit conditions. It follows that 'self-protecting' circuits depending on the automatic breakover of a thyristor in case of excessive voltage are to be avoided, unless the thyristor is specifically

3.2.5 Firing Angle Determination in Naturally Commutating Converters

The basic function of a firing angle control circuit attached to a naturally commutating converter is normally to determine the delay angle, in relation to the a.c. supply voltage, so that the desired voltage is applied to the load in accordance with a control input—i.e., in most cases to serve as a voltage-to-delay angle transducer. The systems principally employed are:

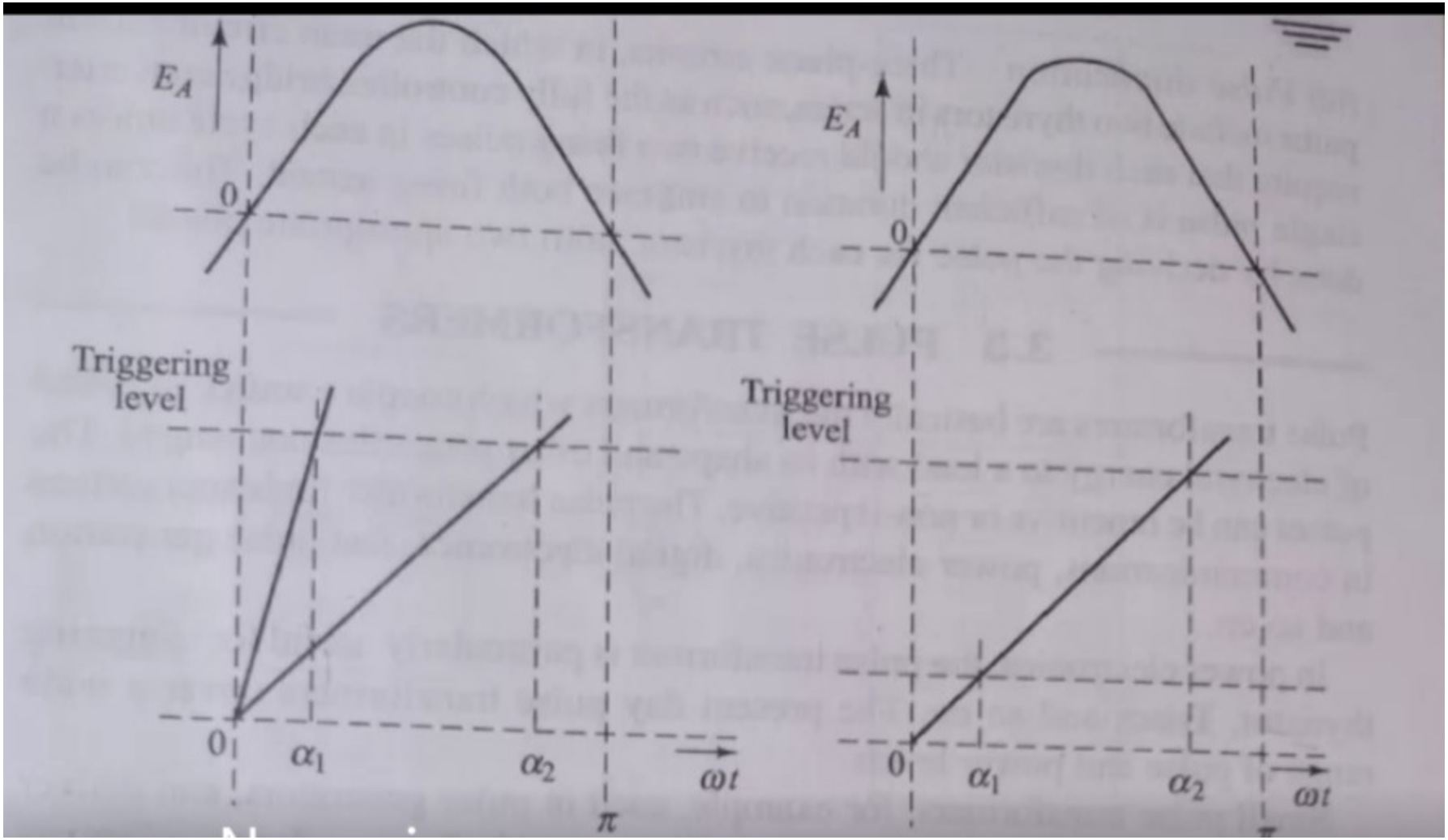
(a) Variable phase shift circuits
(b) Magnetic amplifiers
(c) Circuits in which the firing angle is determined by the intersection of a repetitive waveform, synchronous with the supply, and a reference or control level
(d) Digital timing circuits.

1. Variable Phase Shift A voltage or current is produced with a controllable

(d) Digital timing circuits.

1. *Variable Phase Shift* A voltage or current is produced with a controllable phase relationship to the supply voltage and firing pulses, are generated at the zero-crossing points of the phase shifted waveforms. Most circuits of this type are suited less to electrical than to manual control, and do not readily provide the full 180° range that is commonly required.

2. *Magnetic Amplifiers* In suitable configurations, magnetic amplifiers can be made to produce output voltage waveforms closely resembling those of a half controlled bridge rectifier (discussed in Chapter 6), and their ideally linear relationship of mean output voltage to mean control voltage implies exactly the variation of 'firing angle' required to obtain a similar characteristic in a controlled rectifier. This makes them superficially attractive for thyristor firing circuits. In practice, the output from a conventional magnetic-amplifier is generally not suitable for firing a thyristor directly because of its poor rise time and variation of its


E_A
0
Triggering level
0
α_1
α_2
π
ωt
E_A
0
Triggering level
0
α_1
α_2
ωt