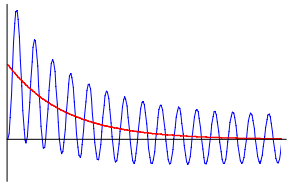
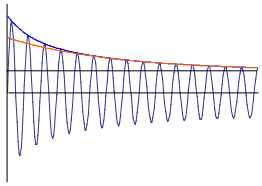
Transient Reactance in Synchronous Generators

Transient reactance comes into picture on sudden application of a dead short circuit on the terminal of a synchronous generator. General features regarding transient reactance are listed below.

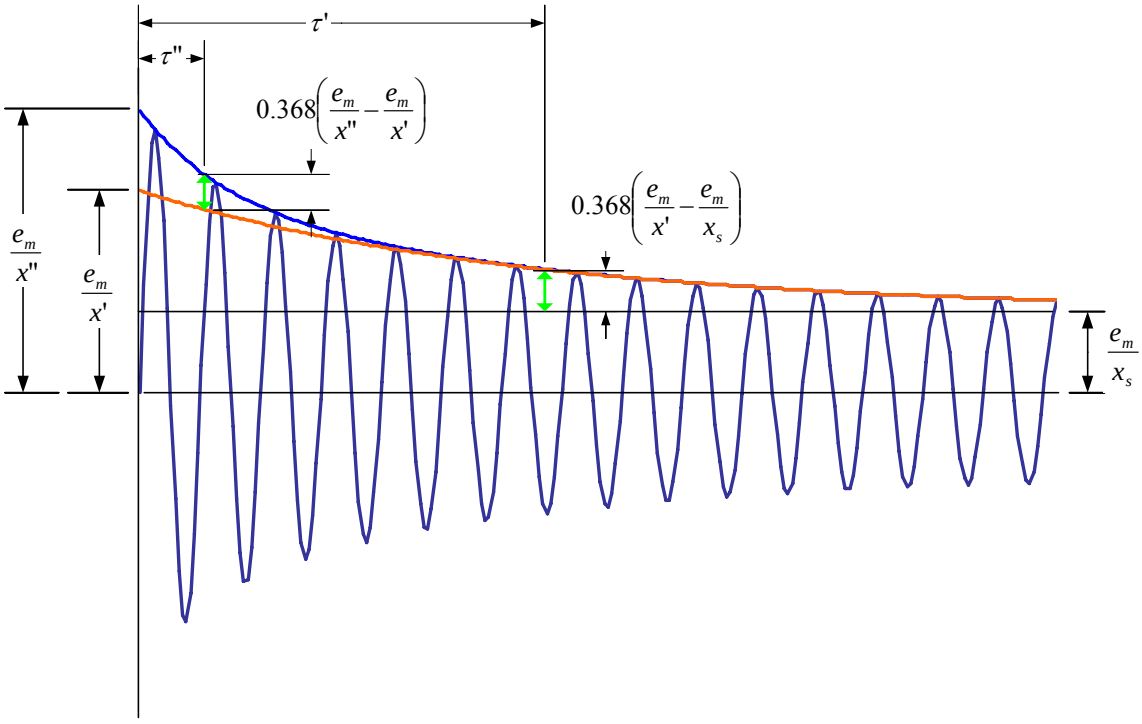
- Initial ac component of short circuit current is determined by the leakage
- Initial dc component is determined by the instant of short circuit
- There could be asymmetry in at least two phases
- Maximum asymmetry is when the short circuiting at voltage zero
- Dc component in armature current produce stationary poles and in turn produce varying field current on the rotating poles. The dc component vanishes rapidly.
- The ac component of short circuit current attenuates slowly to a value determined by the synchronous reactance x_s.



Short circuit at voltage zero



Short circuit at voltage maximum



τ' – Transient time constant
x' – Transient reactance
x" – Subtransient reactance