



SUMMARY OF TRANSMISSION LINE SWITCHING STUDIES

Transmission systems are subject to overvoltage surges produced by transmission line switching operations. These overvoltages appear as traveling waves on the transmission network, occurring in a millisecond time frame, usually as a result of circuit breaker operation. The magnitude and shape of the switching overvoltages vary with the system parameters and network configuration. Even with the same system parameters and network configuration, the switching overvoltages are highly dependent on the characteristics of the circuit breaker operation and the point-on-wave where the switching operation takes place. The worst-case initiating events occur when a circuit breaker pole closes into a line with pre-existing trapped charge at a time when the source voltage is of the opposite polarity of a trapped charge. This condition causes a collapse of approximately a 2.0 p.u. overvoltage across the circuit breaker pole. The highest overvoltages result when a traveling voltage wave reaches an open breaker, causing it to tend to double in magnitude, stressing the circuit breaker insulation (across the bushing), the insulation across the open breaker contacts, and the transmission line insulation. The transient voltages generated from switching transmission lines can have an impact on the equipment design and protection. This subsection describes the numerous studies performed by MEPPI related to transmission line switching.

MEPPI has performed a wide variety of detailed studies. More information on specific analysis types is available upon request.

