Summary: Voltage fluctuations which cause lamp flicker tend to propagate from the point of origin to various parts of a power system exhibiting some level of attenuation depending on factors such as system impedances, composition of loads, and frequency components of the fluctuating waveform. Maintaining the flicker levels at various busbars below the planning limits specified by the standards is crucial, and in this regard it is important to develop an insight into the manner in which the flicker propagates via systems operating at different voltage levels.

Synchronous measurement campaigns and other measurement programs support the concept of flicker attenuation and suggest that large proportions of induction motors assist in attenuating flicker compared to residential loads consisting of passive devices. In existing methods of flicker transfer analysis, induction motors are usually represented by a hypothetical dynamic impedance which is assumed to be the transient impedance of conventional third order induction motor model. This representation would be insufficient for flicker transfer studies as voltage fluctuations responsible for flicker contain numerous frequency components, whereas traditional dynamic induction motor models reflect the motor response to voltage changes of fundamental frequency only.

This presentation reports on development of flicker transfer analysis methodologies applicable for radial and interconnected power systems particularly considering the influence of induction motor loads on flicker attenuation. Dynamic behaviour of induction motors is represented by small signal models which can be used to establish the response of the motors to low frequency fluctuations in the supply voltage. The contribution of induction motors of different sizes and other influential factors such as system impedance, loading level of the motor will be examined. Small signal analysis is used to investigate the propagation of flicker in both radial and
interconnected networks. Dependency of flicker attenuation on frequency of voltage fluctuation will also be discussed.