Title	HVDC CABLE CONDITION MONITORING TECHNOLOGY BASED ON LINE IMPEDANCE RESONANCE METHOD (LIRA)

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SUMMARY

Cable condition monitoring and early fault detection of electrical cables are certainly important processes required in electrical power system operation. It has a considerable influence on the safety and quality of supply. The ability to monitor electrical cables towards achieving the early detection and accurate location of faults allow to anticipate severe consequences that can be costly and catastrophic.

Comparing to severe damages like open/short circuits, soft local or global degradation such as insulation damage, natural aging, water infiltration, etc., are more difficult to detect and identify, until they become severe and eventually lead to a forced shutdown. Soft damages normally cause minor physical properties changes and consequently electrical characteristics changes along cables and their signatures are not easily detectable. The existing traditional fault detection techniques are not enough effective to detect these small anomalies, because of their weak effects on electrical signals and are often masked by noise or highly attenuated by losses, particularly in very long cables.

Line Impedance Resonance Analysis (LIRA) technique, a non-destructive test based on frequency domain reflectometry, is the possible promising solution for power cable condition monitoring, which enables system operators and cable manufacturers to monitor the cable health and to provide early fault detection of their electrical cables. In this paper, the capability of LIRA technology in cable monitoring, diagnostic, and prognostic and its accuracy to detect and localize the faults is discussed, by referring a HVDC measurement case.

Compared to other fault-location techniques, LIRA presents a number of advantages, namely, its sensitivity to detect the soft damages in power cables and its robustness against long cables such as HVDC cables.