**Background**

- Underground cable is long, but degradation is localized.
- Partial replacement may be more cost-effective than full replacement.

**Objective**

- Locate degradation due to water trees.

**Result**

- Partial degradation by water tree was located as an echo in time-domain measurement.
- Water tree was recognized as an electret, of which behavior was influenced by pre-biasing.
- Degradation signal was discriminated from various other echoes from mismatching points.
- The technique is quite feasible and attractive.
- Spatial resolution would be as short as 100 m.

**Principle**

- DC bias
- Depolarizing pulse
- Reference pulse
- Echo
- Mismatch
- Terminate

**Diagram**

- HV
- DC bias
- Depolarizing pulse
- Reference pulse
- Echo
- Mismatch
- Terminate

**Subtracted signals**

- Bias: 0 kV
- Bias: -5 kV
- Bias: -6.5 kV
- Bias: -7 kV

**Conclusions**

- Partial degradation by water tree was located as an echo in time-domain measurement.
- Water tree was recognized as an electret, of which behavior was influenced by pre-biasing.
- Degradation signal was discriminated from various other echoes from mismatching points.
- The technique is quite feasible and attractive.
- Spatial resolution would be as short as 100 m.