Pre-saturated Core Fault Current Limiter (PCFCL)

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Motivation

Unless suitable counter measures are taken, the ever growing fault levels in distribution networks are expected to become a major barrier for the connection of environmentally friendly distributed generation (DG) and for the implementation of Smart Networks. Fault current management using active fault current limiters (FCLs) is becoming a viable solution and creating interest for all stakeholders, including distribution network operators (DNOs), government regulators, DG developers, researchers and manufacturers.

Technology

The FCL that has been developed by GridON under this project is based on pre-saturated core technology. Designed using rudimentary electromagnetic principles (standard transformer technology), GridON's self-triggered PCFCL suppresses prospective fault currents on distribution and transmission networks. Using a unique and proprietary concept of magnetic flux alteration (requiring no superconducting or cryogenic components), the FCL's impedance rises instantaneously upon fault condition. It limits the fault current for its entire duration and recovers to its normal condition immediately thereafter; guaranteeing protection from consecutive faults.

The project is commissioned and funded by the Energy Technologies Institute. E.ON New Build & Technology is providing technology consultancy services to the project, which include network analysis, data management and quality assurance. UK Power Networks is the host DNO.

11kV, 10MVA PCFCL

Current Status

An 11kV, 10MVA PCFCL has been built and successfully tested at an ASTA certified test facility. It is currently in service for field demonstration at the Newhaven Town primary substation of UK Power Networks in East Sussex, UK.
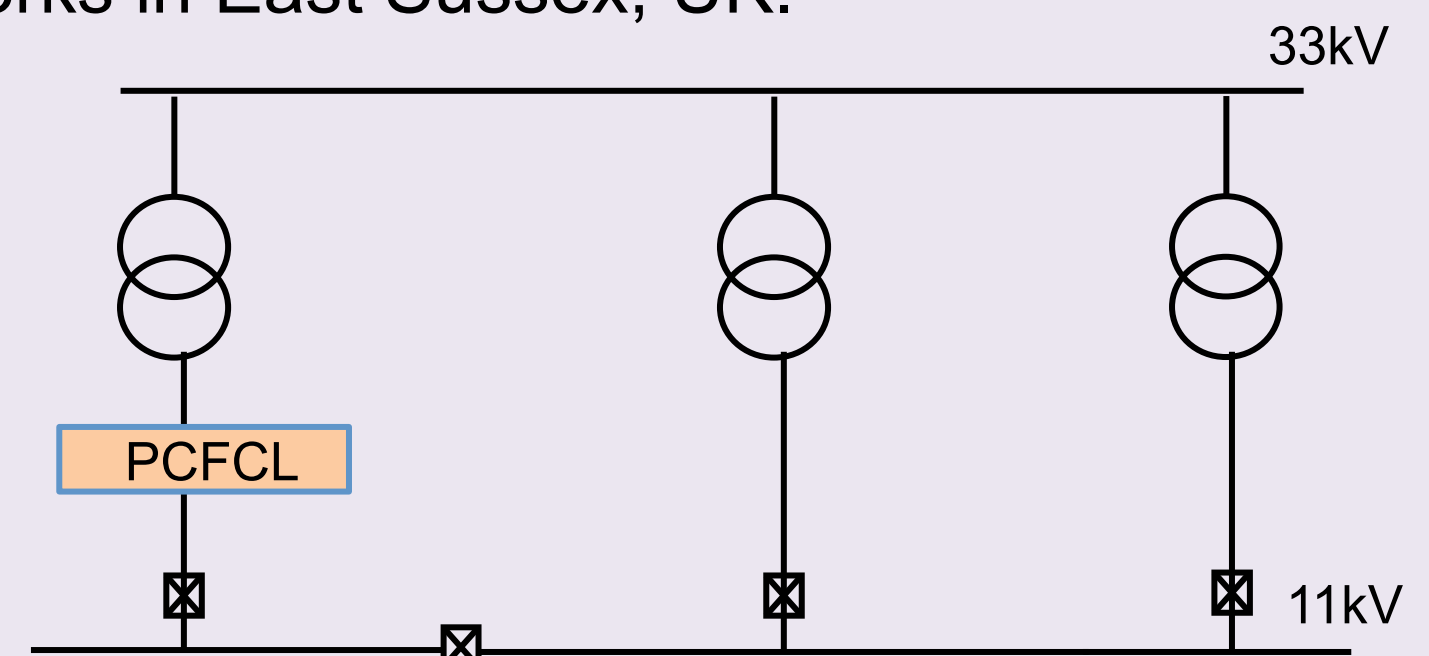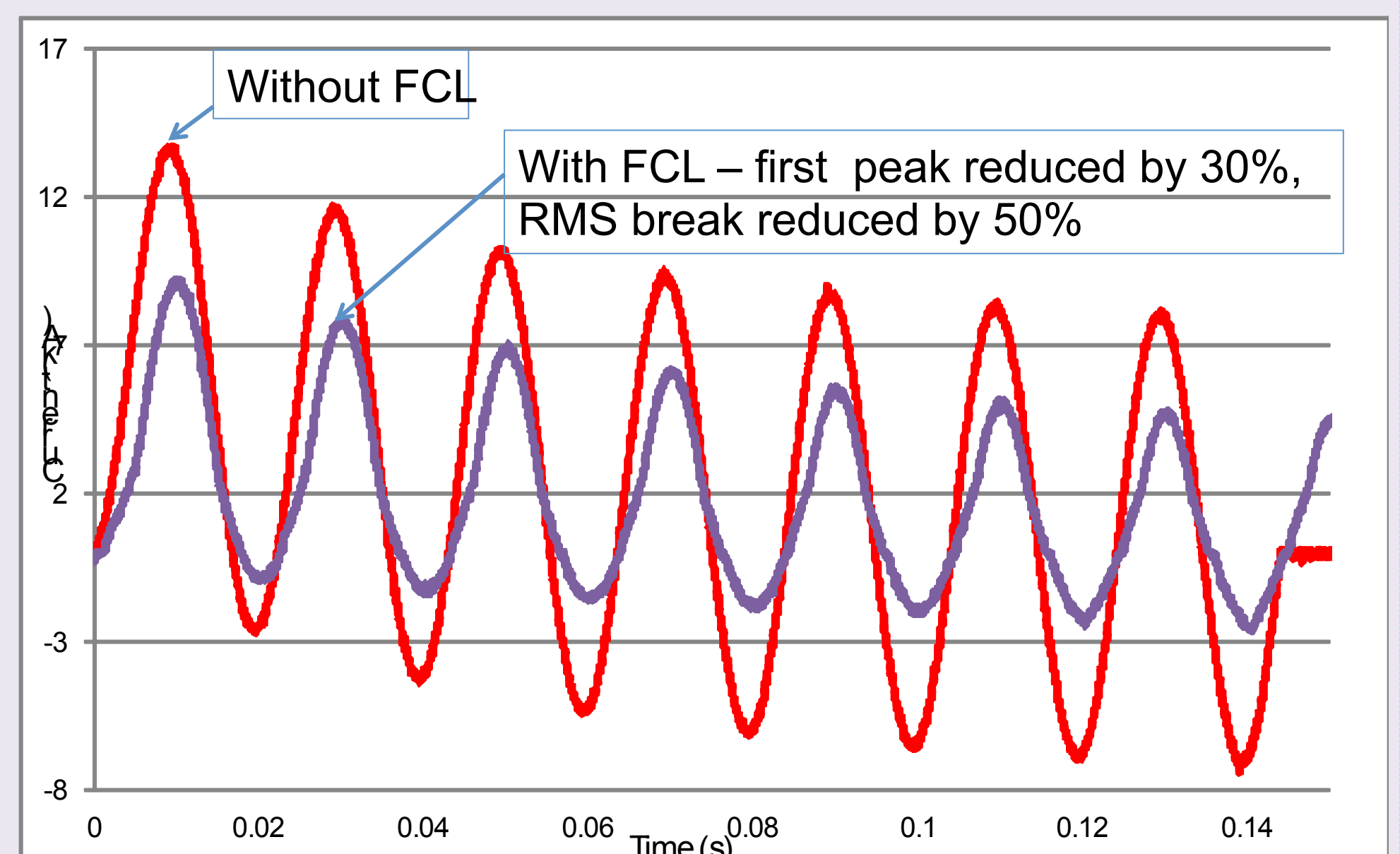

High Voltage Test Results

Tested successfully (in the factory and at ASTA test facility) for:

- Voltage withstand
- Voltage drop
- Fault withstand
- Fault limiting
- Instantaneous recovery under load
- Harmonics

FAULT LIMITING PERFORMANCE

Without FCL

With FCL – first peak reduced by 30%, RMS break reduced by 50%

ON-LOAD RECOVERY PERFORMANCE

Load Current

Instantaneous recovery

Limited fault current