

Piano delle Attività e progetto di ricerca dell'Incarico di Ricerca dal titolo

Modellazione e simulazione della durata e dell'affidabilità in ambienti software COMSOL Multiphysics e MATLAB volta alla pianificazione di sistemi in cavo HVDC

(Titolo in inglese) Life and reliability modelling and simulation in COMSOL Multiphysics and MATLAB environments applied to HVDC cable system projects”

The activities of the researcher shall include:

- 1) the development in COMSOL Multiphysics environment of a simulation tool for calculating the distribution of temperature and electric field in HVDC cable system joints under transients of load current (e.g. load cycled) and transients of applied voltage (e.g. energization and voltage surges);
- 2) the refinement of an existing comprehensive algorithm developed in Matlab environment for life and reliability modelling of HVDC cables under typical service stresses (load current cycles, temporary overvoltages, voltage surges, damped oscillating transient voltages), using both a macroscopic approach to electrical conductivity (based on analytical relationships fitted to conductivity measurement results) and a microscopic approach, based on a bipolar charge transport model.
- 3) Measurements of space charge and electrical conductivity on flat specimens of insulating materials for HVDC cable systems as an experimental support to the activities listed at previous points 1) and 2)

The researcher duties and responsibilities are as follows:

- a) perform the necessary development work of the simulation tool in COMSOL Multiphysics environment described at above point 1)
- b) perform the necessary refinement work of the algorithm for life and reliability modelling of HVDC cables described at above point 2)
- c) perform the necessary simulative work for validating the algorithm by means of comparison with the literature data on the same or similar materials, as well as with the outcomes of the experimental results obtained during the measurements described at above point 3).
- d) analyze and interpret results, drawing inferences and conclusions.
- e) collaborate with the other partners involved in the NEWGEN project for better interpretation and utilization of the outcomes.
- f) Use research results to write reports, papers and reviews and present findings in journals and conferences.