Giuseppe Messina - ENEA

Engineering Degree

Scientific Activity

Giuseppe Messina graduated in 2006 at the University of Palermo as Dr. Electrical Engineer. Since 2000 he has been involved in ENEA for the DC electrical characterization of Superconducting wires and has carried out his thesis work on the power diodes characterization for the protection of the superconducting magnets of the LHC.

In December 2006 he was selected by ENEA for a position in the **Superconductivity laboratory** as engineer and works in the field of superconductivity applied to magnets for fusion, electric machines and energy storage.

He started his activity with the simulation study in Matlab environment of the discharge electrical circuit insert in the TF coils system of JT60 during the normal operations and fault conditions (quench), and designed the quench protection and detection system of superconducting magnets to be characterized within the ASTEX (Advanced STability EXsperiment) facility set up at the Frascati ENEA center. Moreover, he was one of the group members who carried out a conceptual study of the ISTTOK upgrade to a superconducting device.

In 2008 he was appointed responsible of the contract for the development of a synchronous axial flux electrical machine prototype equipped with MgB_2 massive rings placed on the rotor disc. Afterwards, he begins to investigate, manufacture and characterize HTS coils to assemble the windings of a superconducting electric machine, and won the Coiltech Energy Efficiency Award 2013. At the moment he is working on the design and development of a superconducting synchronous electrical machine in axial flux configuration.

His research interests covered many fields of electrical engineering, as measurement theory and techniques and superconducting devices, and of finite element simulation study.

Within the DTT project he carried out and/or is developing:

- the preliminary study for the conceptual design of the quench detection system for TF coils;

- modelling of the Toroidal Field coils circuit to obtain a conservative estimation of the peak voltage difference inside the coils during an electromagnetic transient and to estimate the maximum voltage difference across the insulator in case of fast discharge;
- the preliminary study for the conceptual design of the quench detection system for CS and PF coils;
- a circuit model of CS and PF coils to estimate the maximum voltage difference across the coil terminal during the different plasma scenarios.

He is the author or co-author of several scientific works which were published in international journals. He was tutor of engineering students and PhD students who done a thesis and a stage, respectively, at the ENEA laboratories.