

Cycle of studies: Bachelor LT

Degree course: Energy engineering

Title of the thesis: Design of the tests for the Passive Protection Circuit of the High Voltage RadioFrequency Test Facility

Type: experimental, modelling

RFX Supervisor: Marco De Nardi

Academic supervisor: Paolo Bettini

Head of the RFX research group: Elena Gaio

Leader of the RFX research program: Vanni Toigo

Description of the thesis:

Within the R&D program on RadioFrequency (RF) driven negative ion sources for Neutral Beam Injectors (NBI) for the heating of the plasma in controlled thermonuclear fusion experimental plants, an experiment called “High Voltage RadioFrequency Test Facility” (HVRFTF) has been developed at Consorzio RFX. HVRFTF is dedicated to the study of the voltage hold off of parts of the ion sources subjected to high RF electric fields and operating in vacuum. These studies are of interest for the two experiments SPIDER and MITICA of the “Neutral Beam Test Facility” (NBTF) of the experimental reactor ITER.

In HVRFTF the high voltage is produced by means of a resonant circuit supplied by an amplifier. A passive protection circuit was conceived and designed in order to prevent that an electrical breakdown of one of the components of the resonant circuit results in an overvoltage applied to the output stage of the amplifier.

The proposed activity foresees the study of the resonant circuit and the passive protection circuit in order to prepare a test procedure for the verification of the effectiveness of the protection in limiting the over voltages seen by the amplifier. Numerical and circuital models will be developed by the student to simulate the test procedure, verify the feasibility of the test and to obtain the expected waveforms. Depending on the time required for the realization of the test circuit, the student will be able to participate to the realization of the tests.

Previous experience (if necessary): Electrical engineering, analysis of linear circuits, basic knowledge of programming tools (Matlab or Python, Simulink)

Date: 18/01/2022

Status: available

Name of the student: (when assigned)