Contribution ID: **11** Type: **not specified**

Contribution to safety analyses of DEMO HCPB using AINA code

Monday, 17 September 2018 11:00 (2 hours)

The main motivation of the current work, framed under the safety EUROfusion activities to develop DEMO, is to present the conclusions drawn from our contribution to the safety studies of the HCPB DEMO design carried out by the team tasked with AINA code development. During 2016 and 2017 a new AINA version has been built and properly validated in order to evaluate plasma evolution and in-vessel components strains inside the European DEMO designs. As a result, AINA is able to simulate several accident scenarios as plasma disruptions or structural material meltings due to a LOPC (Loss Of Plasma Control) and in-vessel melt either of FW, blanket structure and/or divertor modules because of thermal stresses due to a LOCA (Loss Of Coolant Accident). After due analysis, it has concluded that it would be desirable to carry out a possible design review focused on ensuring a suitable operating temperature range with a bigger safety margin for all the materials which make up the HCPB BB, as well as the need to guarantee a quick detection and actuation by means of a proper system, depending on the affected equipment, when the most demanding transients take place which may drive the reactor to suffer a melting scenario and a very energetic plasma disruption at the same time. These events include an increase of fueling injection above 50%, a permanent improvement in the confinement time and a punctual impurity increase above 300%. Other perturbations has been studied, which some of them only provide information on non-dangerous cases as a decrease of the fueling injection rate, impossible situations from a technical or physical point of view as an unexpected and sudden increase of external power injection above 630% or melting processes as LOCAs (for any severity level) or a decrease of the external power injection.

Co-authors: Dr BAEZA, Eduard (Polytechnic University of Catalonia (UPC)); Dr DE BLAS, Alfredo (Polytechnic University of Catalonia (UPC)); Dr RIEGO, Albert (Polytechnic University of Catalonia (UPC))

Presenter: Dr BAEZA, Eduard (Polytechnic University of Catalonia (UPC))

Session Classification: P1

Track Classification: Power Plants Safety and Environment, Socio-Economics and Technology Transfer