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## P3.175 A complete EM analysis of DEMO WCLL Breeding Blanket segments during VDE-up

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Within the EUROfusion consortium, a big effort is made in order to analyze the electromagnetic loads that act on the in-vessel components during normal and off-normal operations, being an important input for their structural assessment. With regard to the Breeding Blanket (BB) project, a global DEMO EM model, feasible to account for different blankets design, has been developed last year with the capability to analyze EM transients in presence of both toroidal and poloidal magnetic field and considering materials with non-linear magnetic properties. Using the FE model based on the WCLL design, a VDE-up with a 74 ms current quench time was analysed. The main differences of the present with the previous analyses, only focused on eddy currents (and thus, on the related Lorentz's forces), are the evaluation of:

- 1) the effect of the electrical connections of the port plugs with the VV;
- 2) the interaction of the BB magnetized material and magnetic field (ferromagnetic forces).

The first analysis showed a significant change in the eddy currents path especially during the thermal quench, underlining the importance to consider carefully the electrical contacts with the VV. For what concern the second point, being the structural material of the BB segments, EUROFER, a ferromagnetic material with a magnetic saturation of  $\sim 1.8$  T, relevant ferromagnetic forces (in the range between 5 and 10 MN in the radial direction) have been found to act on the Inboard and Outboard segment. This result becomes of particular importance especially for the definition of the attachment system with the VV. Furthermore, the contribution due to Halo currents has also been analyzed, giving thus a complete view of the EM loads behavior during the considered off-normal events.

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