

Tipo di tesi: Laurea Magistrale Ingegneria

Corso di Laurea: Area dell'Ingegneria Industriale (Meccanica, Chimica e dei Materiali/dei Processi Industriali, Energetica, Energetica)

Tipologia: teorica e numerica

Titolo della tesi:

Thermo-hydraulic and integrated modelling in support of DEMO plant design.

Proponente: Matteo Zaupa, Mauro Dalla Palma

Relatore Accademico: P. Sonato

Capogruppo: Mauro Dalla Palma (Plasma Engineering Group)

Argomento della tesi:

Fusion power plants should provide a baseload supply of large amounts of electricity. The path towards this goal runs through the demonstration fusion power plant (DEMO) that will be operated as a steady state electricity source, although the near term conservative operation will be pulsed to cope with physics and technology limits. This pulsed scenario, with temperature range of the primary coolant depending on the breeding blanket concept, represents a predictable intermittent thermal energy source producing a cyclic load and so requiring thermal energy storage through heat transfer fluids and media. Energy storage could enhance the economic viability and profitability of the plant, but with lower temperatures at the secondary circuit and therefore decreasing the thermal efficiency of the power cycle.

The work will consist of sizing and designing the cooling plant to exhaust the thermal power and developing 3D-1D coupled thermo-hydraulic models of the first wall and breeding blanket to characterise and simulate the conditions of the heat sources. Then, the transfer of the heat load from the primary to the secondary circuit will be simulated in an integral plant model including concepts of energy storage systems and electromechanical generators.

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Stato: non assegnata

Laureando/a: -