

Study of a load resilient matching circuit for the ITER ICRH/FWCD system by means of its mock-up.

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The study is based on the S matrix measurements versus antenna loading made on the mock-up¹ of the original design of the ITER antenna array with external matching². A matching solution grouping the 24 straps of the ITER antenna array in 4 “conjugate T” (CT) circuits through pre-matching network is investigated. 6 decouplers alleviate the mutual coupling effects between these 4 circuits and their power sources. Any toroidal phasing with good load resilience is possible without modification of hardware. Two matching procedures are investigated: the first one only controls the toroidal phasing of the strap current distribution and does not control their amplitudes which are becoming very unsymmetrical at low loading; the second controls the current distribution (amplitude and phase) and the load resilience by the choice of the reference loading and the associated antenna current distribution (amplitude, toroidal and poloidal phasing).

The use of line stretchers or compact lumped series tuners for the CT adjustment is compared and their implementation on ITER discussed.

The replacement of CTs by quadrature hybrids and its influence on the load resilience performance is also investigated.

[1] A. Messiaen et al., Nucl. Fusion **46**(2006)S514.

[2] A. Messiaen et al., AIP Conf. Proc. **694** p.142 (2003); P. Dumortier et al., *ibid.* p.94.