Name	Degree	% participation
Ivo Samuel Lages Militão Silva Carvalho	MsC	100%

Part I – Scientific Activities

Tokamak ISTTOK

Summary and highlights of research achievements

Upgrade of the ISTTOK data acquisition system, Conditioning of all ISTTOK signals into ATCA MIMO board

ISTTOK control system is now able to read real-time signals from seven different diagnostics: (i) magnetic mirnov coils (x12), (ii) tomography, (iii) interferometer, (iv) electric probes, (v) magnetic sine coil, (vi) magnetic cosine coil and (vii) H-alpha. In addition the all the power supplies currents and loop voltage are also measured by the control system. This real-time data is used to obtain an integrated feedback control for the plasma current, position and density. This system is currently under commissioning procedures.

ISTTOK real-time control system

A new ISTTOK real-time control system based on ATCA boards developed on site was implemented on top of the MARTe real-time framework and is currently under commissioning. The operator has now a visual environment based on the MARTe HTML server to program the session. This new control system features the time windows concept allowing for distinct control strategies during each plasma current cycle (for alternate plasma current dischages). It can be specified the number of alternate cycles and the system will repeat the stored time windows configuration for either plasma current direction, this allows the operator to have different control strategies settings for each plasma current cycle, repeating itself in the next same plasma direction cycle.
This system was successfully integrated with ISTTOK control and data acquisition system FireSignal.

New ISTTOK magnetizing field power supply

The new ISTTOK ohmic circuit power supply is currently under commissioning. This switched mode power supply allows ISTTOK to operate with a controlled plasma current throughout the pulse and also extends the duration of the alternate plasma current discharges.
This IGBT based power supply has an internal control cycle of 28.86 kHz and communicates optically with the new ISTTOK control system at 921,6 kbaud. The switched mode power supply has two distinct modes of operation: (i) internal PID controller and (ii) remote PWM setting. In mode (i) the power supply micro-controller receives the current set-point from the control system and uses the feedback from a current transducer to match the desired current value, in mode (ii) to allow a more complex algorithm, the micro-controller receives directly the duty cycle calculated in the control system and then feeds it directly to the IGBT's gates, in this mode the micro-controller monitors the safety of the power supply operation to override the output when needed.
The new magnetizing field power supply is based on a switching IGBT h-bridge that can operate at up to 240V, with a current range from -200A to 200A. This power supply is connected in series with 2 tokamak poloidal coils with 14 turns each.

Participation in the collective use of the JET facilities by the EFDA Associates

Summary and highlights of research achievements

Trainee session leader at JET tokamak

Participation in the JET Session Leader course and selection to be trained as a JET session leader. A total of 7 sessions were performed during this year as a trainee session leader.

Part II – Scientific Output

A. Publications

Papers in international refereed scientific journals

Author(s)	D.F. Valcarcel, A. Neto, I.S. Carvalho, B.B. Carvalho, H. Fernandes, J. Sousa, F. Janky, J. Havlicek, R. Beno, J. Horacek, M. Hron, R. Panek
Paper title	The COMPASS Tokamak Plasma Control Software Performance
Journal name	IEEE Transactions on Nuclear Science
Volume, page	58, 1490 - 1496
Year	2011

B. Publications and contributions in conferences and workshops

Papers in conference proceedings

Author(s)	A. Neto, D. Alves, I. S. Carvalho, P. J. Lomas, R. Felton, P. McCullen, V. Riccardo, F. G. Rimini, A. Stephen, K-D. Zastrow, F. Maviglia, G. De Tommasi, R. Vitelli
Paper title	Shape Controller Upgrades for the JET ITER-like Wall
Conference	13th International Conference on Accelerator and Large Experimental Physics Control Systems (ICALEPCS'11)
Volume, page	MOPMU035

Year	2011