Integration of Lost Alpha-Particle Diagnostic Systems on ITER

M. Sasao, M. Isobe [A], M. Nishiura [A], B. J. Peterson [A], C. Walker [B], R. Barnsley [B]
T. Hirouchi, N. Kubo, H. Nishimura, H.Utoh, A.Okamoto, Y.Tanaka, K. Shinto, S. Kitajima
Tohoku University, 6-6 Aoba, Aramaki, Aoba, Sendai 980-8579, Japan
[A] National Institute for Fusion Science (NIFS), 332-6 Oroshi, Toki, Gifu 509-5292, Japan
[B] ITER International Team, Max-Planck-Institut Plasmaphysik, 85748 Garching, Germany

Time-resolved measurement of lost alpha particles on the first wall is required at ITER, because various kinds of collective instability are anticipated to be driven by them. Moreover, localization of alpha-particle loss on the first wall is one of the problems that should be noted most for the safe operation of ITER. However, the severe thermal/radiation environment of measurement location and the difficulties of access and installation limit the application of conventional measurement tools[1].

The ITER integration are studied for some candidates of lost alpha-particle measurement, such as an IR camera, camera imaging of scintillators on the FW[2], a scintillator probe, a Faraday-cup, and an imaging bolometer[3]. A full-orbit calculation of escaping alpha particles is inevitable, and the orbit characteristics are considered in the conceptual design of these systems.

[1] M. Sasao, et al., Plasma Phys. Control. Fusion 46 (2004) S107-S118
[2] T. Saida, et al., Advanced Diagnostics for Magnetic and Inertial Fusion, Edited by Stott et al, (Kluwer Academic/Plenum Press, New York, 2002), 133-136
[3] B. J. Peterson et al., submitted to this conference.

This work is supported by Ministry of Education, Culture, Sports, Science and Technology (MEXT) under the Scientific Research of Priority Areas, “Advanced Diagnostics for Burning Plasma Experiment.”