DESC 磁気平衡結果を用いた W7-X ボロメータ計測のトモグラフィー開発
Development of tomography for W7-X bolometers with the DESC-computed equilibrium

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Bolometry is an important measurement for magnetically confined plasma devices to investigate the radiation loss from plasmas, the impurity transport, density limit, etc. Furthermore, the tomography technique is often used to reconstruct a spatial radiation profile. We focus on the bolometer system installed in W7-X and develop a tomography system with the novel unique mesh configuration based on the magnetic flux surfaces calculated by DESC; a 3D MHD equilibrium solver [1].

In order to obtain a reliable solution for the tomographic reconstruction, one of the most effective methods is to apply spatially discretized meshes along the plasma shape where the radiation is emitted. Figure 1 shows examples of tomography mesh configurations in a poloidal cross section with a toroidal angle of 36° with DESC-defined grids. Combining some fine DESC-computed meshes enables us to create new ones with high prior geometric information. In the presentation, we will refer to the results of the tomography test with the bolometry system installed in W7-X and explore the most useful grid configuration for tomography.

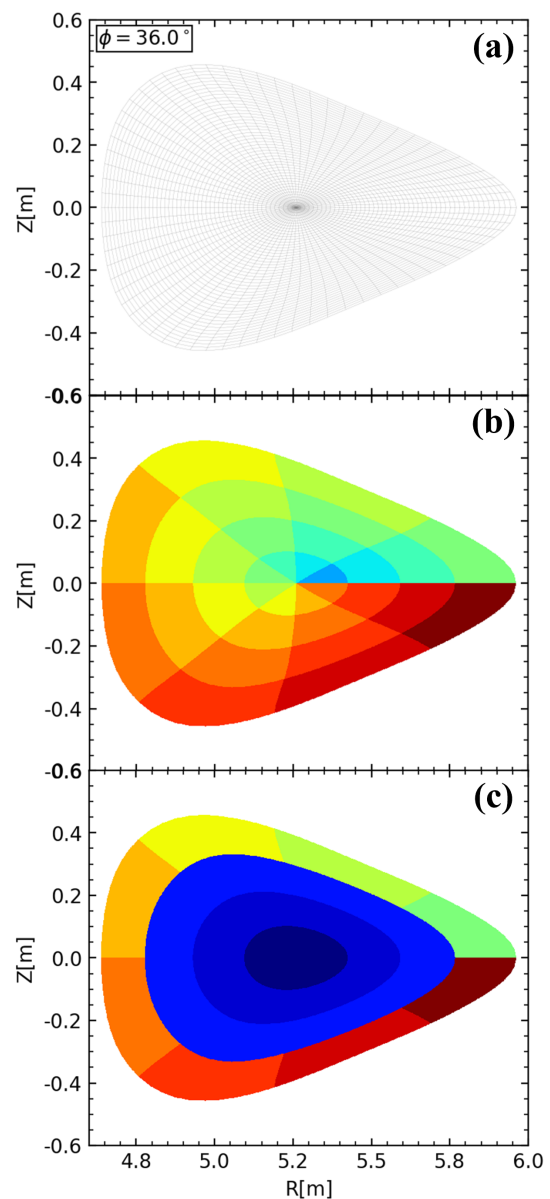[1] D. W. Dudt et al., Phys. Plasmas **27**, 10.1063/5.0020743 (2020).

Fig. 1: (a): The original DESC-computed grid, (b): reduced resolution grid (4 by 8 radially/poloidally), (c): core-edge-like zoning grid (11 zones totally). Meshes with different indices are colored separately.