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Lesson from Tungsten Leading Edge Heat Load Analysis in KSTAR Divertor[1] SUK-HO HONG, National Fusion Research Institute, RICHARD ANTHONY PITTS, ITER Organization, HYEONG-HO LEE, EUN-NAM BANG, CHAN-SOO KANG, KYUNG-MIN KIM, HONG-TACK KIM, National Fusion Research Institute, KSTAR TEAM TEAM, ITER ORGANIZATION COLLABORATION — An important design issue for the ITER tungsten (W) divertor and in fact for all such components using metallic plasma-facing elements and which are exposed to high parallel power fluxes, is the question of surface shaping to avoid melting of leading edges. We have fabricated a series of tungsten blocks with a variety of leading edge heights (0.3, 0.6, 1.0, and 2.0 mm), from the ITER worst case to heights even beyond the extreme value tested on JET. They are mounted into adjacent, inertially cooled graphite tile installed in the central divertor region of KSTAR, within the field of view of an infra-red (IR) thermography system with a spatial resolution to 0.4 mm/pixel. Adjustment of the outer divertor strike point position is used to deposit power on the different blocks in different discharges. The measured power flux density on flat regions of the surrounding graphite tiles is used to obtain the parallel power flux, q||impinging on the various W blocks. Experiments have been performed in Type I ELMing H-mode with Ip = 600 kA, BT = 2 T, PNBI = 3.5 MW, leading to a hot attached divertor with typical pulse lengths of 10 s. Three dimensional ANSYS simulations using q||and assuming geometric projection of the heat flux are found to be consistent with the observed edge loading.

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