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Two-dimensional visible light and SXR imaging studies for impurity influx in a low-aspect-ratio RFP AKIO SANPEI, SADAO MASAMUNE, SHUN NAKANOBO, RYOSUKE TSUBOI, SATOSHI KUNITA, HARUKA MAKIZAWA, HARUHIKO HIMURA, Kyoto Institute of Technology, SATOSHI OHDACHI, NAOKI MIZUGUCHI, TSUYOSHI AKIYAMA, National Institute for Fusion Science — The measurement of visible light emission and bremsstrahlung soft X-ray (SXR) radiation are useful passive methods for diagnosing high-temperature plasmas, because these emissivity distributions correspond to plasma density, temperature and impurities. In a low-aspect-ratio (low-A) RFP machine RELAX (R = 0.51 m/a = 0.25 m (A = 2)), two dimensional (2D) high-speed visible light imaging using a high-speed camera and SXR imaging diagnostics were developed to identify the emission structures associated with dominant MHD instabilities in the RFP. In the present study, impurity release associated with phase locking of the dominant m =1 modes has been studied using 2D imaging diagnostics. A rotating helical structure has been revealed by both 2D images of visible light and SXR. The rotating helical structure tends to be wall-locked during phase locking of the dominant modes. The appearance of the rotating helical structure of H_α emission has shown to be correlated with an increase in emission intensity of iron impurity. Moreover, hollow SXR emissivity distribution has been observed in deeper reversal discharge (F ∼-1.5). The appearance of the hollow and helical structure of SXR image may be an indication of an increase in iron impurity influx.

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