Recent developments of the linear plasma device SWORD

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In the Comprehensive Research Facility for Fusion Technology (CRAFT) program, a divertor material/component testing project has been launched at the Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP) to address the key R&D issues of plasma-facing materials/components for Chinese DEMO reactor in appropriate physical regimes, size and time scales of plasma-material interactions.

After 7-year's R&D and construction, a linear plasma facility named SWORD (Superconducting plasma Wall interactiOn lineaR Device) has been put into service successfully. This machine employs a 3 T superconducting-magnet to confine plasmas and an arc plasma torch to produce intense plasma streams with a particle flux up to several times of 10^{24} $m^{-2}s^{-1}$. The plasma diagnostics include emission spectrum and target probes. Additional Thomson scattering and laser interferometric measurements are under development. Recently, we have reached the milestone of 1000 s continuous discharges at 10^{24} $m^{-2}s^{-1}$ flux. The production and measurement of such discharges are reported here.

The overarching goal of SWORD is to produce plasmas in the strongly coupled regime with a peak particle flux > 10^{25} $m^{-2}s^{-1}$, a peak heat flux > 80 MW m^{-2} and a beam size > 20 mm simultaneously. The motivation and approach will be explained.

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