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Laboratory experiments on a plasma-flow-state transition from diverging to stretching a magnetic nozzle KAZUNORI TAKAHASHI, AKIRA ANDO, Tohoku University — Axial magnetic field induced by a plasma flow in a divergent magnetic nozzle is measured when injecting the plasma flow from a radiofrequency (rf) plasma source located upstream of the nozzle. The source is operated with a pulsed rf power of 5 kW, and the high density plasma flow is sustained only for the initial 100 microseconds of the discharge. The measurement shows a decrease in the axial magnetic field near the source exit, whereas an increase in the field is detected at the downstream side of the magnetic nozzle. These results demonstrate a spatial transition of the plasma-flow state from diverging to stretching the magnetic nozzle, occurring more upstream than thought, where the importance of both the Alfven and ion Mach numbers is shown.

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