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Initial Development of the NSTX-U Snowflake Divertor Control[1]
PATRICK VAIL, EGEMEN KOLEMEN, Princeton University, ANDERS WELANDER, MATTHEW LANCTOT, General Atomics — A feedback control system has been implemented at NSTX-U for real-time detection and manipulation of snowflake divertor (SFD) magnetic configurations. The SFD is an alternative magnetic divertor concept that is characterized by a second-order null formed by two x-points in close proximity. The SFD is an attractive option for heat flux mitigation for NSTX-U in which unmitigated peak heat fluxes in standard divertor operation near 20 MW/m^2 may compromise plasma-facing components. The real-time control system at NSTX-U is capable of simultaneous control of multiple SFD parameters, such as the separation between the two x-points in the divertor region and their orientation. Control of SFD configurations in NSTX-U has been simulated in TOKSYS using the upgraded sets of poloidal field coils in both the upper and lower divertor regions. Performance of the real-time control system and its effect on plasma performance will be assessed experimentally as an initial step toward the development of the SFD concept at NSTX-U.

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Patrick Vail
Princeton University

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