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[ ] Theory [ ] Experiment

Modeling of Steady-state Scenarios for the Fusion Nuclear Science Facility, Advanced Tokamak Approach,* A.M. Garofalo, V.S. Chan, R. Prater, S.P. Smith, H.E. St. John, *GA*; O. Meneghini, *Oak Ridge Assoc. U.* – A Fusion National Science Facility (FNSF) would complement ITER in addressing the community identified science and technology gaps to a commercially attractive DEMO, including breeding tritium and completing the fuel cycle, qualifying nuclear materials for high fluence, developing suitable materials for the plasma-boundary interface, and demonstrating power extraction. Steady-state plasma operation is highly desirable to address the requirements for fusion nuclear technology testing [1]. The Advanced Tokamak (AT) is a strong candidate for an FNSF as a consequence of its mature physics base, capability to address the key issues with a more compact device, and the direct relevance to an attractive target power plant. Key features of AT are fully noninductive current drive, strong plasma cross section shaping, internal profiles consistent with high bootstrap fraction, and operation at high beta, typically above the free boundary limit, $\beta_N > 3$.

[1] M.A. Abdou. et al., Fusion Technol. **29**, 1 (1996).

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