Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Development of a Novel Method for Determination of Momentum Transport Parameters[1] MICHAEL J. PETERS, Indiana Univ - Bloomington, WALTER GUTTENFELDER, Princeton Plasma Physics Laboratory, FILIPPO SCOTTI, Lawrence Livermore National Laboratory, STANLEY M. KAYE, WAYNE M. SOLOMON, Princeton Plasma Physics Laboratory — The toroidal momentum pinch velocity V_φ and diffusivity χ_φ in NSTX were previously determined from the transient response of the toroidal rotation Ω following applied n=3 magnetic perturbations that brake the plasma [1,2]. Assuming $\Pi = nmR^2(-\chi_\phi \nabla\Omega + V_\phi \Omega)$, where the momentum flux Π is determined using TRANSP, these local analyses used fits to Ω and $\nabla\Omega$ to obtain χ_ϕ and V_ϕ one flux surface at a time. This work attempts to improve the accuracy of the inferred $\chi_\phi(r)$ and $V_\phi(r)$ profiles by utilizing many flux surfaces simultaneously. We employ nonlinear least-squares minimization that compares the entire perturbed rotation profile evolution $\Omega(r,t)$ against the profile evolution generated by solving the momentum transport equation. We compare the local and integrated approaches and discuss their limitations. We also apply the integrated approach to determine whether an additional residual stress contribution (independent of Ω or $\nabla\Omega$) can be inferred given experimental uncertainties.

[1] W. Solomon et al., Phys. Rev. Lett. **101**, 065004 (2008).
[2] Kaye et al., Nucl. Fusion **49**, 045010 (2009).

[1]This work supported by the U.S. Department of Energy SULI program and contract DE-AC02-09/CH11466, as well as the LLNL contract DE-AC52-07NA27344.

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Date submitted: 24 Jul 2015 Electronic form version 1.4