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Multimode Plasma Response in the EAST Tokamak.¹ LANG CUI, NIKOLAS LOGAN, Princeton Plasma Phys Lab, SHUAI GU, GUOQIANG LI, Institute of Plasma Physics Chinese Academy Of Sciences, RAFFI NAZIKIAN, Princeton Plasma Phys Lab, CARLOS PAZ-SOLDAN, General Atomics, YOUWEN SUN, HUIHUI WANG, Institute of Plasma Physics Chinese Academy Of Sciences — A multimodal plasma response to $n = 2$ RMPs was found in EAST tokamak low β_N plasmas. The signature of the multimodal response is the difference in the radial (B_r) and poloidal (B_p) magnetic field dependencies on the applied phasing (poloidal structure). A difference in the 3D coil phasing that maximizes these two responses is observed only in response to $n=2$ fields, while the $n=1$ B_r and B_p have the same phasing dependence. Neither the maximum B_r nor B_p agrees with the best phasing for ELM mitigation in experiments. GPEC modeling accurately reproduces the experimental measurements only when multiple eigenmodes of the plasma response are included. The measured plasma response is not dominated by resonant current drive from the external field, with non-resonant contributions playing a large role. These results on EAST demonstrate a new type of multimode response based on the variation of the polarization of the plasma response to the 3D field. The results clearly demonstrate the danger of associating any one sensor array with desired physics consequence of 3D fields and the need for 3D modeling to predict optimal 3D field configurations in multi-modal plasmas.

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Lang Cui
Princeton Plasma Phys Lab

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