RMP-Induced Plasma Transport Near X point\(^1\) J.D. CALLEN, C.C. HEGNA, U. Wisconsin-Madison — The experimentally most noticeable effect of resonant magnetic perturbations (RMPs) on H-mode plasmas is “density pump-out.” This effect is most evident in the near-separatrix region where RMPs can cause the electron density gradient there to decrease by a factor of up to two. The previously developed flutter model \([1]\) produces some RMP-induced transport in this region. However, two other electron effects need to be taken into account in the X point region of the divertor separatrix. First, small 3D fields can cause significant (many cm) radial motion of field lines in “homoclinic tangles” very near the X point which have been observed experimentally in DIII-D. A flutter-type plasma transport model based on parallel electron collisional effects caused by RMP-induced “radial” motion of field lines away from the lowest order axisymmetric magnetic flux surfaces in the X point region is being developed. The second effect is that a small fraction of long length magnetic field lines in the near-separatrix region are “open” ones which are directly connected to material walls in the divertor region. Electrons on such field lines could conduct significant electron heat to the divertor plates.

\(^{1}\) J.D. Callen, et al., Nucl. Fusion \textbf{53}, 113015 (2013).

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Jim Callen
U. Wisconsin-Madison

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