Collisionless Scrape off Layer

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Plasma particle absorption by the liquid lithium surface (LiWF regime) creates unique plasma edge situation:

- $T_{edge} \simeq T_{core}$;
- $n_{edge} \ll n_{core}$;
- ***The SoL becomes collisionless;***
- ***Thermal force in the SoL is eliminated;***
- ***Thermo-electric currents in the SoL are eliminated;***
- ***Instead the mirror-ratio can drive the SoL currents;***
- ***The sheath potential becomes sensitive to the mirror-ratio in the SoL:***
  (a) in its absence $\phi^{sheath} \propto 1/T_{edge} \ll T_{edge}/e$
  (b) with a finite mirror-ration $\phi^{sheath} \simeq T_{edge}/e$
- ***Plasma edge cooling by the secondary electrons from PFC is affected by the mirror confined ions.***

The physics of the Collisionless SoL should be one of the key topics of the Theory in incoming years.

Flux tube equilibria at the plasma edge

The Theory should extend its treatment of the plasma edge stability.

1. ***There is no basic principle justification of the "ideal" MHD plasma model for edge stability;***
2. ***ELM stabilization by the Li-conditioning has been robustly predicted based on perturbed equilibrium theory, rather than on the ideal MHD (and its so-called "peeling ballooning" model).***
3. ***Plasma edge (including the pedestal region) is always perturbed with magnetic field lines striking the PFC***
4. ***The equilibrium situation at the plasma edge does not corresponds to conventional equilibrium models.***
5. ***Flux tubes with the local current densities different from the bulk plasma are possible in the case of RMP and potentially in the quasi-stationary situation.***

The theory of the flux tube equilibria can be done and is necessary for understanding of the plasma edge MHD phenomena