Three-dimensional features in burning plasmas

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A next major step in the research toward magnetic fusion energy production is to carry out experimental campaigns exploring regimes with relevant amount of fusion power. So far, the theoretical knowledge of the path toward a fusion burning plasma has been acquired mainly by performing numerical studies in 0 or 1-1.5 dimensions. Due to the marked anisotropy of magnetically confined plasmas, however, three-dimensional effects might play a role. In particular, the drastic change in magnetic topology associated with reconnecting modes on selected rational magnetic surfaces [1] may decrease the thermal electron conductivity parallel to the magnetic field lines, with a consequent impact on the electron heating due to fusion products. We describe this new scenario, and present analytical and numerical calculations aimed at verifying the impact of reconnection on fusion heating.

References

[1] B. Coppi, *et al.*, Nucl. Fusion **55**, 053011 (2015)