Onset of shearless transport barriers in a magnetically confined plasma

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An $\mathbf{E} \times \mathbf{B}$ drift waves transport model was implemented to investigate the onset and break-up of shearless transport barriers (STBs) when considering a non-monotonic electric field radial profile for a magnetically confined plasma. These barriers were found by using the rotation number profile, since they are located in the profile's equal-zero derivative position. So, considering as a control parameters the amplitude of the electrostatic potential perturbation non-resonant mode and the radial position of the electric field extreme value, we found intervals of the parameters for which the barrier exists, breaks-up or even bifurcates into one or two secondary shearless curves. Also, we found effective transport barriers related with stickiness regions which appear both after the STB breaks up or before the STB arises. In general, we discovered that the STB can emerge recurrently even if we are increasing the perturbation or displacing the electric field profile.

References

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