



Transition from a Dungey convection- to rotation-dominated magnetosphere: Implications of magnetic topology and auroral morphology

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The general applicability of the classic Dungey cycle to planetary magnetospheres is controversial when planetary rotation is faster than the Earth. We demonstrate first-order modifications to transit a Dungey convection-dominated magnetosphere to a rotation-dominated one, using the Earth's magnetosphere as a testbed. By increasing the influence of planetary spin over solar wind merging, we show that when the rotation potential of the polar magnetosphere becomes comparable to the merging potential of the solar wind, the Dungey cycle is modified effectively by azimuthal transport of magnetic flux, resulting in flux pile-up and a more closed polar magnetosphere with crescent-shaped open flux region in the ionosphere. This study provides a theoretical framework describing fundamentals of magnetospheric physics, which is applicable to the Saturn, Jupiter and exo-planets systems.

References

- [1]
- [2]
- [3]

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Note: Abstract should be in (full) double-columned one page.