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Relativistic guiding-center motion of runaway electrons

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To investigate energetic runaway electron dynamics we developed a code that is solving relativistic guiding-center equations of motion. Relativistic high parallel velocities may cause the zero parallel component of the effective magnetic field, so we adopt the toroidally regularized guiding-center theory [1] to avoid that singularity. Because there is a discrepancy between the standard guiding-center coordinates and the toroidally regularized coordinates, we examined the transformation between the two coordinate systems. Using this code, we performed a computational analysis of the characteristics of runaway electron orbits.

References

[1] Burby, J. W. and Ellison, C. L., 2017, Phys. Plasmas 24, 110703

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