



## **Hybrid simulation of the auroral current circuit**

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When using numerical simulations to model the auroral current circuit it is common to use fluid models because of the relatively slow and large-scale processes involved. However, in previous collisionless fluid models the auroral electrons have been assumed to be cold or isothermal and the models have then not been able to reproduce the large field-aligned electric fields seen in observations and predicted by stationary kinetic theory. Introducing particles that are accelerated by the fields in the fluid simulation, we can self-consistently close the set of fluid equations with temperatures computed from the particles. This hybrid model resolves new features in the transient processes during the build-up of an aurora, and the simulation converges to a quasi-stationary state consistent with observations and stationary kinetic theory.