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Time-varying boundary conditions for reconnection in a hybrid simulation

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We present the first preliminary results on a series of magnetic reconnection simulations performed using the 3-dimensional HYB hybrid code. The simulation setup aims at creating a continuous, stationary reconnection process, in an effectively 2-dimensional configuration in this first phase of the study. Two opposing subsonic plasma flows with anti-parallel magnetic fields are driven into the simulation box. Free outflow from the box is allowed on the faces that are perpendicular to the inflow magnetic field direction. Reconnection is initiated at the centre of the box with localized resistivity. We show that the simulation can produce the conventional x-line reconnection geometry including e.g. the quadrupolar Hall fields. After obtaining a stationary reconnection process with steady, symmetric inflows, we experiment with asymmetric inflows mimicking the magnetopause. Then we use time-varying inflow, resembling e.g. mirror mode fluctuations in the magnetosheath, on one or both inflow boundaries to see how this affects the reconnection rate and the appearance of the reconnection region.