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## Numerical experiments on the two-step flux emergence of the sun

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We perform two-dimensional MHD simulations of the flux emergence from the solar convection zone to the corona. The flux sheet is initially located moderately deep (-20,000 km) in the adiabatically stratified convection zone and is perturbed to trigger the Parker instability. The flux rises through the solar interior, but decelerates around the strongly sub-adiabatic (i.e. convectively stable) photosphere. As the magnetic pressure gradient increases, the flux becomes unstable to the Parker instability locally so that the further evolution to the corona occurs. We show the results of the simulation based on this 'two-step emergence' model and of the parameter survey.

Keywords: sun, magnetic field, solar interior, photosphere, chromosphere, corona