Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Flux Rope Formation in Stratified Convection ROBERT STEIN, Michigan State University, AAKE NORDLUND, Niels Bohr Institute, Copenhagen University — Numerical simulations of solar surface convection have been performed for a domain 48 Mm wide by 20 Mm deep. This depth is 10% of the depth of the convection zone, but 2/3 its scale heights. Weak, uniform, untwisted, horizontal magnetic field was advected into the computational domain by inflows at the bottom. The magneto-convection produces a hierarchy of magnetic loops. In general, magnetic field is pumped down and the Poynting flux is downward. However, some flux ropes emerge through the surface and form small active regions. The field initially appears at the surface with mixed polarities in a small subregion of the entire domain. The opposite polarities separate into unipolar intense, nearly vertical "flux tubes" which produce large pores. This active region has dimensions comparable to the scale of the supergranulation near the bottom of the domain and the orientation of the incoming advected field. Penumbra do not form because of the nearby upper potential field boundary condition on the field.

Robert Stein
Michigan State University

Date submitted: 20 Jul 2012 Electronic form version 1.4