

# **MAGNETOHYDRODYNAMICS OF THE SOLAR CONVECTION ZONE**

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Recent developments in theories of the Sun's magnetic field are reviewed. In addition to recent high-resolution observations of magnetic fields on the Sun's surface, realistic numerical MHD simulations are increasingly making an impact in discriminating between various long-standing hypotheses. These include ideas about the structure and formation of sunspots and about the key ingredients in the operation of the 11-year cycle. These developments lead to views of the cycle that are closer to qualitative ideas developed in the 1950's and 60's than the mean field dynamo models of the intervening decades. Confidence in the power of current 3-D radiative MHD simulations has been boosted by successes in reproducing the surface structure of sunspots, the emergence of magnetic regions at the surface, and the small effects that surface magnetic fields have on the radiative output of the Sun.

dynamo, sun, convection, sunspots, instability, solar cycle

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