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Mechanisms of formation ofsolar pores and sunspots

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Abstract

Spontaneous formation of self-organized magnetic structures, such as sunspots and pores, is one of intriguing and oldest problems, which represents a complicated interaction of convection and magnetic fields on different scales. Observations of sunspots and pores formation reveal a fast process of accumulation of emerging magnetic field into stable long-living magnetic structures. However, the physical mechanisms of the flux accumulation into the compact magnetic structures with high field strength and their stability are not clear. Development of observational capabilities, theory, and realistic-type MHD numerical simulations open a new level of our understanding of the turbulent processes of the magnetic field accumulation. I discuss the recent progress in observations and radiative MHD simulations that provide important clues for possible mechanisms of formation and stability of sunspots and pores, and their links to the dynamo process. © International Astronomical Union 2013.

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Keywords

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