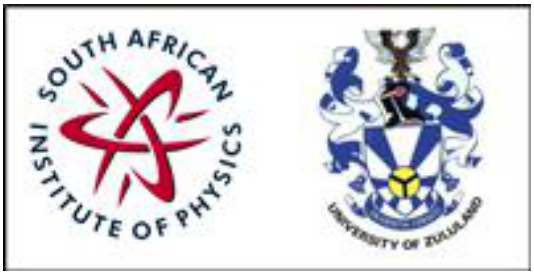

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The robustness of magnetic flux tubes surrounded by magnetoconvection

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Abstract content
   (Max 300 words)

The formation and decay of large magnetic flux tubes, such as sunspots, in the solar photosphere are studied numerically in a domain shaped like a three-dimensional cylindrical wedge. The resistive magnetohydrodynamic equations are solved with parameter values that designate the upper layer of the solar convection zone. It is shown that the formation of magnetic flux tubes from an initial vertical magnetic field depends on the nature of the magnetoconvection, which in turn is dependent on the radial size of the cylindrical numerical domain. In order to study the decay of magnetic flux tubes, the simulations are initialised with an axisymmetric solution that consists of a well-defined central flux tube with an annular convection cell surrounding it. The nonlinear convection breaks the annular cell into many cells along the azimuthal direction, allowing magnetic field to slip between the cells as they push against the central flux tube. This process, known as turbulent erosion, will be demonstrated using numerical simulations.

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