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Time scales of the reversal process in a multiple scale dynamo model

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The duration of both chrons and reversals are inferred from reversal sequences produced by a multiple scale dynamo model.In this schematic $\alpha\omega$ dynamo, a mean-field dynamo action results from an evolving population of cyclones with different types of helical motions. A hierarchical structure of length scales accounts for the nature of turbulent thermal convection at very high Rayleigh number, and cyclones at different length scales contributes to the α-effect. On the other hand, the α-quenching is a consequence of the feedback mechanism of magnetic fields on fluid motions. Then, there is not a direct relationship between the magnetic energy and the magnitude of the α-effect, but the action of mechanism that involves patterns of interactions between the elements of the system over time. Such a feedback is responsible for a wide variety of *emergent* behaviors: (1) reversals of short duration, (2) a constant excusion rate, (3) a progressive population inversion during chrons yielding to reversal. These emerging temporal patterns may not depend strongly on the chosen representation, and we believe that some of the general dynamo mechanism features observed in our model - including the reorientation of large scale flow during reversal and the trend of chrons toward reversal through a kind of erosion process of the flow organization - will be retrieved in continuous and more detailed models, such as the numerical dynamos using the complete MHD equations.