period of 40 minutes. However, we reported that the reversals "mostly had a period of the order of 5 minutes, but that periods up to 20 minutes have been observed."

In a separate approach in 1955, Bullard published the results of numerical integration of a very simple lumped-constant dynamo model. In that model, based on a Faraday-disk dynamo, the output current flowed through a coil to give positive feedback to the initial imposed axial magnetic field.[4] Essentially it was a single-stage amplifier with positive feedback; depending on the conditions, it could give periodic oscillation but no reversals. In 1958 Tsuneji Rikitake (in Tokyo, and never Bullard's student) extended the lumped-constant model to two Faraday disks in series.[5] His model was equivalent to a two-stage amplifier with positive feedback; under certain conditions, it could give oscillations of increasing amplitude, which led to reversals. But the reversals were not periodic; that model is now recognized as an example of a chaotic system.

I have some other comments: The best-fit dipole is currently about 500 km from the geocenter—about 4%, not 10%, of Earth's diameter. Also, the geomagnetic field does not reverse periodically; it is because the reversal record is so erratic that it can be used for dating rocks.

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Kolm replies: I think Frank Lowes's memory is as overpacked as mine. The essence of our disagreement is that he remembers a 1963 model with 5-centimeter-diameter rotors, reversing at a 5-minute period, while I remember seeing a model with 1- to 2-meter-diameter rotors reversing at 20-minute (not 40-minute) periods at a 1967 symposium at the University of Newcastle.[1]

A dynamo of that size is not easily forgotten. The model towered above the heads of the crowd. It was described in the symposium presentation as the "Bullard–Rikitake model," so I assumed that it was based on Bullard's collaboration with a thesis student.

I don't want to engage in a polemic, but I do want to record two facts. First, Earth's magnetic field in the southern Atlantic Ocean is about one-third as strong as it is in diametrically opposite northern Siberia. I measured it with a proton precession magnetometer aboard the research vessel *Pilsbury* in 1968, and I doubt that displacement of a dynamo by only 4% of Earth's diameter will account for so large a difference. Maps of Earth's magnetic field, published by the US Office of Naval Research, confirm the difference. I was searching for magnetic monopoles in deep-sea sediment at the time.

Second, my invitation to the symposium was prompted by Bullard's interest in my published supposition that reversals of Earth's magnetic field might be caused by the planet's encountering magnetic monopoles. Monopoles would have been attracted to Earth's opposite poles and trapped in deep-sea sediment or in surface outcrops of magnetite or hematite.[2] My supposition was later disproved when I found no monopoles in deep-sea sediments or surface outcrops.

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Correction

May 2007, page 64—The Hoover Institution was mistakenly referred to as the Hoover Institute. ■