

May 25, 2023

Dear Editor of SEDI special issue of PEPI,

I am herewith sending you a manuscript entitled “**Kinetic energy transfer during polarity reversal in numerical dynamo simulation**” by Takumi Kera, Hiroaki Matsui*, Masaki Matsushima, and Yuto Katoh, which I would like to submit for publication in *the SEDI special issue of Physics of the Earth and Planetary Interiors*. I carefully prepared the manuscript, following the style of *Physics of the Earth and Planetary Interiors*.

In the present study, we performed numerical simulations of geodynamo with magnetic polarity reversals to investigate energy transfer between kinetic energy for the core flows with equatorial symmetry and antisymmetry during the dipole reversals. The energy transfer to the equatorially antisymmetric flow is generally small, but it increases toward a polarity reversal as follows; (i) the rate of energy transfer from the equatorially symmetric flow to the magnetic field decrease, (ii) the rate of energy transfer from the equatorially symmetric flow to the antisymmetric flow by the advection increase, and (iii) the energy injection by the buoyancy force into the equatorially antisymmetric flow increases. Then, the intense zonal toroidal flow caused by the intense upward flow inside the tangent cylinder in the either hemisphere can trigger a polarity reversal of the magnetic field.

I am sure that the contents of our paper are quite original in the field of SEDI, and that they were presented as a poster in the 17th Symposium of SEDI held in Zurich, Switzerland. None of the material on the present results has been published or is under consideration elsewhere.

Finally, I sincerely hope that our paper will be sent out to referees for their reviews and accepted for publication.

Best regards,

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