Geophysical Research Abstracts, Vol. 9, 04510, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04510

Theoretical analysis and experimental tests of multiple specimen absolute paleointensity determination techniques

K. Fabian (1) and R. Leonhardt (2)

(1) NGU ,Geological Survey of Norway, Trondheim, Norway, (2) Institute for Geophysics, Montanuniversität Leoben, Leoben, Austria

Two recent proposals of multiple specimen measurements appear to have a large potential to improve and simplify absolute paleointensity determination. Both methods, explicitly or implicitly, are based on a fundamental symmetry claim for thermoremanence in multidomain particles (Biggin and Poidras, EPSL 245, 438-453, 2006). This claim states that, independent of grain size, partial thermal demagnetisation and remagnetisation treatments are to first order symmetric with respect to small field shifts. Here we present a theoretical analysis of the assumptions behind this claim and derive the basic conditions for its validity. We further outline how the multiple specimen paleointensity technique proposed by Dekkers and Böhnel (EPSL, 248, 508-517, 2006) relies on these symmetry conditions. Our theoretical analysis and experimental tests suggest only a limited validity of the symmetry relations. We point out that an especially important condition in the multiple specimen technique is, that during heating the field is not set back to zero. Otherwise the symmetry relations would be in marked conflict with previous experimental work. In any case, there are some conflicting experimental data in the literature, which question a full symmetry of TRM processes. We present new experimental data, which show that the multiple specimen method tends to overestimate paleointensity for intermediate PSD to MD particle sizes.