

Abstract Submitted
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Why historical east deviation experiments are so difficult to perform? BAPTISTE DARBOIS TEXIER, LadHyX - PMMH, ESPCI, CAROLINE COHEN, LadHyX, DAVID QUERE, PMMH, ESPCI, CHRISTOPHE CLANET, LadHyX — From the 17th to the 19th century, a big deal was to prove Earth rotation existence. For this purpose, numerous experimental physicists from Borelli in 1668 to Reich in 1832 tried to measure an eastward deviation of a falling sphere. Reich performed 106 falling experiments on a 158.5 m deep mine pit. The mean eastward deviation of its experiments is 2.8 cm. This value corresponds exactly with the theoretical one predicted by Laplace and Gauss expression at Freiberg latitude where experiments were conducted. While Reich took extreme precautions to perform its experiments, the dispersion on its results is very important. Actually aerodynamic lift forces on a smooth sphere made its free fall non perfectly straight. We understand Reich's results dispersion considering fluctuating lift forces intensity on a smooth sphere at those Reynolds numbers ($Re \sim 10^4 - 10^5$). This study provides a criterion above which we can distinguish between lift force and Coriolis deviation during a free fall experiment.

Baptiste Darbois Texier
LadHyX - PMMH, ESPCI

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