Again on Motional EM Induction: Reply to H. Montgomery

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The paper by H. Montgomery published in this issue, [1], exhibits a curious mix between local action models (fields) and non local (action a distance) prospects. When dealing with the motor configuration (Section 4, figure 7), Montgomery makes use of the (Amperian) surface currents instead of the ***B**-field* itself. By analysing the case B (the probe anchored to the turntable in the singularity), he recognizes, according to Newton`s third law, force cancellation between the probe and the rims of the singularity: the probe becomes unable to spin the magnet. Astonishingly, he adds: *"…but the more distant parts of the magnet still produce a force on the probe…"* These few words deserve caution since for a field theoretician the suitable tool for force calculations is Laplace`s expression, $d\boldsymbol{F} = Id\boldsymbol{l}\boldsymbol{x}\boldsymbol{B}$, where ***B*** is the magnetic field *in which the wire is immersed*, but not the distant field. Conversely, the field model works when applied to the *closing circuit wire*, which (being in true contact with the ***B**-field*) is the responsible for the observed counter-clockwise rotation!.

When dealing with the generator configuration (Section 3, figure 5), a similar sketch is offered by Montgomery. The first time

derivative of the ***B****-field* can be detected in the laboratory, but not at points fixed on the turntable. In other words, on the probe (according to Montgomery, the seat of the induced *emf*) there will be $\partial \boldsymbol{B}/\partial t = 0$, as if the turntable were at rest in the laboratory.

It is worthwhile to quote some recent remarks on motional induction [2]: *"The above described has become a critical issue in physics calling for the scientific community's attention: if both BT and GV are right, the difference between turning magnets and electromagnets will have to be elucidated… And if the conclusions arrived at by both are confirmed, the whole classical field theory will have to be reformulated since the inductive effects caused by a given magnetic field spatial distribution would have to be classified according to its source"*. Now we quote Jackson's views on this matter [3]: *"Although **E** and **B** thus first appear just as convenient replacements for forces produced by distributions of charge and current, they have other important aspects. First, their introduction* ***decouples conceptually the sources from the test bodies*** *experiencing electromagnetic forces. If the fields **E** and **B** from two source distribution are the same at a given point in space, the force acting on a test charge or current at that point will be the same, regardeless of how different the source distributions are."*.

Closing Section 4, and referring to our new experiments on confined-shielded fields [4,5], Montgomery wrote: *"…it is not clear what new evidence his most recent experiments provide"*. Our answer is that our most recent experiments provide the following new evidence: to disclose the behaviour of electro-mechanical devices related to motional induction, never considered in the past as far as we know.

At the end, we need to point out that not a single word against Maxwell's field theory was ever mentioned in our papers. Our main

goal was to throw light on the relative-absolute motion conundrum in the realm of motional electrodynamics.

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References

[1] H. Montgomery, Some Comments on J. Guala-Valverde's Experiments on Unipolar Induction, *Apeiron* **14**, 31 (2007).

[2] R. Achilles & C. Moreno, Spinning Magnets and Relativity: Guala-Valverde vs. Barnet, *Physica Scripta* **74**, 449 (2006).

[3] J. D. Jackson, *Classical Electrodynamics*, Second Edition. John Wiley & Sons, New York, page 3 (1975).

[4] J. Guala-Valverde, R. Blas & M. Blas, Non Local Motional EM Induction, *Apeiron* **12**, Nº4 , 409 (2005).

[5] J. Guala-Valverde, R. Blas & P. Mazzoni, Non Local Motional Induction, *Annales de la Fondation Louis de Broglie*, **31** Nº1 , 75 (2006).