An EMDR-converter with low rotational speed

Prof. Dr. W. Claus Turtur
University of Applied Sciences Braunschweig-Wolfenbuettel
Salzdahlumer Str. 46/48, Germany - 38302 Wolfenbuettel, Email: c-w.turtur@ostfalia.de

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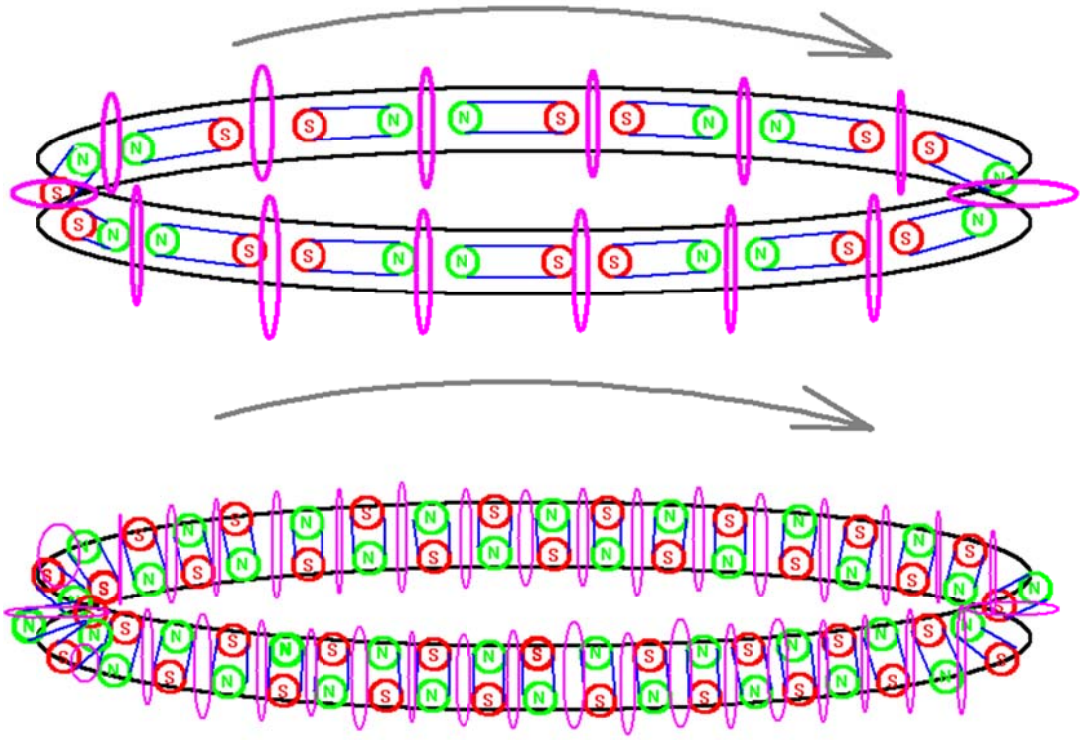
Abstract:
At [1], the author suggested an EMDR-converter, with such high rotational speed that the rotational frequency causes serious engineering problems for the realization. Thus the author now suggests an EMDR-converter with slow rotation, to make it easy to build up a prototype.

Article body:
The main problem with regard to the rotational speed of the spinning magnet in [1] is the alignment of the frequency of the mechanical rotation of the magnet to the frequency of the electrical oscillation in the LC-oscillation-circuit. The AC-frequency of the magnetic poles passing the coil has to follow the electrical frequency in the circuit. In figure 33 of [1], a solution to this problem was indicated, using a high-order multipole-magnet.

The problem of this solution is: If the dipole-magnet is replaced by a high-order multipole-magnet-array, the magnetic stray field will be too diffuse to allow a proper induction of AC-voltage into the coil around the magnet. The consequence is that the EMDR-converter will not run properly with a high-order multipole-magnet.

A remedy to this problem is the application of a special geometry of several coils, which have to take up the induced voltage from the rotating magnets, and which have to generate the Lorentz-force (and torque) accelerating the rotating multipole-magnet-array: It should be very small coils wrapped directly around the path of the magnets as close as possible, so that the cross section area of each coil is just large enough that the magnets can pass the coil. And the length of each coil must be smaller than the distance of the magnetic poles from each other. The consequence is, that the rotation of the magnets must be organized without a radius arms (such as they are for instance used at bicycle-wheels) and a central bearing, because each coil must describe a closed loop around the path of the rotating magnets.

Drawing as addendum:



Literature reference:
[1] Turtur, C.W. (2011). Construction Guidelines for a ZPE-converter on the basis of realistic DFEM-computations, PHILICA.COM, ISSN 1751-3030, Article number 233, (3. April 2011)