Reviewer 1:

The manuscript presents a good amount of data describing the influence of B0 and B1 distortions in the presence of metal (electrodes) with and without air bubbles underneath. The work describes both experiments and calculations. The main conclusion is that calculations match experiments reasonably well, and that the rf field dependence has a somewhat nonintuitive behavior. While the work is very important, as a reader, I find it very difficult to follow. The Figures are not very clear and do not highlight very well what needs to be paid attention to. For example, in Fig. 3, it would probably be better to represent the results as 2D contour or pcolor plots, rather than 3D projections. Each panel could be labeled in addition with a descriptive text, which would make it much easier to appreciate what it is showing.

> Thank you for your valuable feedback. We worked on the clarity of all figures and implemented your suggestions, but also applied some further modifications. As the type of spatially resolved spectras, as presented in Fig. 3, is not often published and, therefore, there is no universal way of visualisation of these data, we have discussed various plot options and found the 3D waterfall plots the most expressive. Since both reviewers found Fig. 3 difficult to follow, we agreed to change the style of representation into pseudocolor plots. Even though the narrow lines in some experiments, such as (a) and (i), are now more difficult to recognise, the enhanced visibility of spectral intensity speaks for this representation style.

Fig. 4 appears to have an odd combination: proton density and rf field distribution, and it is unclear why these two different data sets have been put together.

> The correlation of these values is described in the main text for the chosen pulse length. We added the explanation to the figure caption. Additionally, the figure was rearranged to enhance clarity of the figure.

Fig. 5 could probably benefit from an additional histogram, or some other representation that would allow to identify field changes better.

> An additional plot with a histogram of B1 field distributions was added to the figure. Additionally, the position of Cu coins was marked by dashed lines in the original figure.

Figs. 6 and B3 are probably the most interesting ones, but are very hard to follow, it is not clear in which order the lines were plotted, it seems labels are missing.

> It seems that labels were not shown by the reviewer's pdf reader, because the lines in the plot were labelled directly in the figure without a legend. Here, we noticed that another font type was used for the labels, which has been changed in all figures to the font of the "(a)" and "(b)" labels. However, in this case, a legend was added in Fig. 6a.

So overall I would recommend to enhance the clarity of figures and subsequently update the surrounding explanatory text to help the reader navigate the manuscript.

Reviewer 2:

The manuscript describes a qualitative validation method for evaluating B0 and B1 distortions in NMR techniques used in electric cell research. The study includes two experimental setups that simulate the effects of different components of an electric cell (copper electrode, air bubble) on B0 and B1, respectively. The simulation and experimental results corroborate each other, providing a valuable reference for studies that combine electrochemistry and nuclear magnetic resonance. The manuscript is well written, and the experiments are carefully designed. For this reason, it is suitable to be published in Magnetic Resonance.

However, there are still several points that require further clarification prior to publication:

1. The manuscript aims to verify B0 and B1 distortions introduced by electric cells in NMR experiments, so the liquid medium should ideally be an electrolyte. However, the authors only used an electrolyte in the first B0 distortion verification experiment. In all other simulations and experiments, water and HPLC water were used as the liquid medium, without any explanation for this change. This should be clarified.

    Thank you for your feedback and thorough reading. This explanation is indeed missing and was added to the experimental section (l. 134f).

2. Page 5, Figure 1: The manuscript indicates that the B0 field direction is aligned with the marked z-axis. It would be helpful to include the B0 field direction in the figure for clarity.

    The direction of B0 field was added to the figure accordingly.

3. Page 6, Line 142: The phrase "0.5445 times the length" is unclear. Is this an empirical value or is it derived from literature? If it is based on literature, a reference should be provided.

    This is indeed not an arbitrarily chosen value, the reference was added accordingly.

4. Page 7, Figure 3: The figure is well-designed, but the intensity changes in some subfigures, particularly (a), (c), and (i), are difficult to discern. Improving the visibility of these changes would enhance the figure's clarity.

    The unclarity of figure 3 was also criticised by reviewer 1. The intensity changes are now visible with the change of style to a pseudocolor plot.

5. Page 8, Line 188: The term "electrolyte under the electrode" should refer to the water used in the simulation, as mentioned on Page 7, Line 180. This needs to be corrected.

    This is true and was corrected accordingly.

6. Page 9, Figure 4: The manuscript should clarify whether the simulated B1 field intensity is derived from the B1 field vector as a whole or just from the component perpendicular to the B0 field.

    Thank you again for thoroughly reading through the manuscript. The according statement is added to the main text and the figure caption.

7. Page 14, Table B1: The nutation frequency listed for a 0.1 mm distance and 5 mm PEEK does not match the label of Figure B2(f). This discrepancy needs to be addressed.

    This is true and was corrected accordingly. In the course of reviewing the nutation data, the data point at time t = 0 µs with zero intensity was added to all nutation curves. This changed all numerical values of nutation frequencies and field enhancements to a small extent. The overall correlation and accordance of data was not influenced.

8. Figure B1 (a) and Figure B2 (e): Although these figures display obviously different nutation curves, they share the same nutation frequency. An explanation for this should be provided.

   This due to the limited number of discrete values chosen for the nutation experiment. 80 different pulse length were tested and zero filling with a factor of 2 was used. This resulted in 160 discrete values for the nutation frequency. Apparently, these two experiments showed the highest value for the exact same nutation frequency. An according statement was added to the figure captions.

9. Figure B2: The nutation curves in (a) and (c) indicate a significant degradation in B1 field homogeneity. This degradation only occurs when the discs' thickness is 1 mm and the distance is 0.1 mm. The reasons behind this specific case should be explored.

   This is due to the way of integration of peaks for the evaluation of nutation experiments. To distinguish, which resonance in the 1H spectra can be assigned to the water signal from between the coins, 1H CSI was applied before nutation experiments. Water from outside the gap between the coins, e.g. in the thin film between PEEK cylinders and the glass tube, showed a significant different chemical shift. Using CSI, this could be distinguished from one another, and the integration value for nutation experiments was chosen accordingly. In the case of figure B2 c) two resonances could not be resolved entirely, but instead another component seems to be mixed into the signal, as also a second small peak in the nutation frequency plot is apparent. The explanation of the way of integration was complemented in the text of appendix B.

10. The changes in B1 field homogeneity, as indicated by the nutation curves in figure B1 and B2, should be compared with simulation results. This comparison could provide further insights.

    Since we believe these changes in B1 field homogeneity are due to the integration boundaries, as described above, this experimental data was not further compared to simulation results.