Qeios

Peer Review

Review of: "Enhanced Channel Estimation for Double RIS-Aided MIMO Systems Using Coupled Tensor Decompositions"

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This work addresses the channel estimation problem in a double RIS-assisted MIMO system via a coupled tensor decomposition approach. The commonality of some of the channels among the links present in the training process is exploited, along with a protocol for setting the reflection coefficients. Namely, they are reused a second time, with their signs reversed. This allows for the cancellation of signal terms that would otherwise prevent the separate estimation of all the channels involved. The idea could not be characterized as extraordinary, but it is certainly interesting and simple enough for what it manages to achieve. The manuscript is overall well-written, although it contains some typos and language mistakes and could benefit from a revision. It is recommended to accept this manuscript for publication, subject to the following revisions:

1. The meaning of some terms used is not always clear. Starting from the title itself, what does enhanced mean? Enhanced over what? The same question applies to most of the uses of this word in the text. Another example is “associated.” In the abstract, for example, it is not clear to what components the authors refer nor the meaning of channels that are associated with these. Maybe channels that are present or are involved would be a better way to express this. When discussing identifiability conditions, it is frequently said that these hold in order to have accurate estimates in the least squares sense. To this reviewer′s understanding, these conditions are what one needs in order to be able to solve for the corresponding least squares problems. Why is it about accuracy?
2. Several typos exist and need to be fixed. For example, the Khatri-Rao (not Khatrio) product is very often written as \circ, although it has initially been defined to employ the symbol \diamond. When

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referring to single-reflection etc. links, please use the dash consistently. \cdots is sometimes used where \ldots would be needed. Often, matrices are denoted by nonbold symbols. Least squares, not least square. Please be consistent in your use of the acronyms: D-RIS vs. DRIS, C-KRAFT vs. CKRAFT, etc. An important detail is how i.e. is used. Very often, it should instead be “namely.” What is Q_1 in (A.1)? Do the references have to be written completely in italics? Please also insert spaces wherever needed (e.g., agood performance, unfoldingof).

3. In the introduction, “in contrast to [23]”: what has that work proposed?
4. Has the Identity tensor been defined?
5. Please be explicit whenever a term like enhanced or less expensive is used. The question is “compacted to what?”
6. Last but not least, given the crucial role of (4) and (5) in the entire procedure, the authors should comment on the sensitivity of their methods to the validity of these relations. What if, in practice (as could happen, for example, due to hardware inaccuracies), the reflection coefficients of the two states are not exactly opposite?

Declarations

Potential competing interests: No potential competing interests to declare.