

Globe-hopping

Dmitry Chistikov, Olga Goulko, Adrian Kent and Mike Paterson

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Review timeline

Original submission: 21 January 2020

Revised submission: 12 May 2020

Final acceptance: 15 May 2020

Note: Reports are unedited and appear as submitted by the referee. The review history appears in chronological order.

Review History

RSPA-2020-0038.R0 (Original submission)

Review form: Referee 1

Is the manuscript an original and important contribution to its field?

Excellent

Is the paper of sufficient general interest?

Good

Is the overall quality of the paper suitable?

Excellent

Do you have any ethical concerns with this paper?

No

Recommendation?

Accept as is

Comments to the Author(s)

This manuscript constitutes an important advancement towards fully utilizing the advantage offered to by the most complete---up to date---generalization of Bell inequalities, i.e. the "grasshopper inequalities". The paper considers two directions.

In one, the practically most relevant grasshopper problem on a sphere is restricted to its grand

circle. The authors' solutions also illustrate how powerless our intuition is this class of problems--a failure similar to the one one experiences when the questions pertaining to the ergodicity and the temporal to ensemble average convergence in the irrational rotation problem. For one, there is a dramatic difference between cases when the first lawn and the second lawn are the same and the case when they are different. Also, the dangerously looking finite precision loophole unexpectedly closes when the circle is extended to the sphere.

In the spherical case, the authors refute two significant conjectures proposed in the foundational paper by Kent and Pitalua-Garcia. Also, for not too large jump angles, the intuition gained and the numerical methods developed by two of the authors in the planar case [Gulko-Kent (2017)] is proven useful and relevant in the spherical one.

The importance of this paper for improving the security of quantum encryption is hard to overestimate, and I suggest publishing as is.

Review form: Referee 2

Is the manuscript an original and important contribution to its field?

Excellent

Is the paper of sufficient general interest?

Excellent

Is the overall quality of the paper suitable?

Excellent

Can the paper be shortened without overall detriment to the main message?

Yes

Do you think some of the material would be more appropriate as an electronic appendix?

Yes

Do you have any ethical concerns with this paper?

No

Recommendation?

Accept with minor revision (please list in comments)

Comments to the Author(s)

This is a well-written paper. I have some comments:

1- The computational complexity of Globe-hopping should be discussed. I suggest using the big oh notation.

To have an unbiased view in the paper, there should be some discussions on the limitations the Globe-hopping

Decision letter (RSPA-2020-0038.R0)

29-Apr-2020

Dear Dr Goulko,

On behalf of the Editor, I am pleased to inform you that your Manuscript RSPA-2020-0038 entitled "Globe-hopping" has been accepted for publication subject to minor revisions in Proceedings A. Please find the referees' comments below.

The reviewer(s) have recommended publication, but also suggest some minor revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript. Please note that we have a strict upper limit of 28 pages for each paper. Please endeavour to incorporate any revisions while keeping the paper within journal limits. Please note that page charges are made on all papers longer than 20 pages. If you cannot pay these charges you must reduce your paper to 20 pages before submitting your revision. Your paper has been ESTIMATED to be 22 pages. We cannot proceed with typesetting your paper without your agreement to meet page charges in full should the paper exceed 20 pages when typeset. If you have any questions, please do get in touch.

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- Funding statement

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*Write simple English: this is intended for the general public. Please explain any essential technical terms in a short and simple manner.

*Describe (a) the study (b) its key findings and (c) its implications.

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Once again, thank you for submitting your manuscript to Proceedings A and I look forward to receiving your revision. If you have any questions at all, please do not hesitate to get in touch.

Best wishes
Raminder Shergill
proceedingsa@royalsociety.org
Proceedings A

Reviewer(s)' Comments to Author:

Referee: 1

Comments to the Author(s)

This manuscript constitutes an important advancement towards fully utilizing the advantage offered to by the most complete---up to date---generalization of Bell inequalities, i.e. the "grasshopper inequalities". The paper considers two directions.

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Referee: 2

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Author's Response to Decision Letter for (RSPA-2020-0038.R0)

See Appendix A.

Decision letter (RSPA-2020-0038.R1)

15-May-2020

Dear Dr Goulko

I am pleased to inform you that your manuscript entitled "Globe-hopping" has been accepted in its final form for publication in Proceedings A.

Our Production Office will be in contact with you in due course. You can expect to receive a proof of your article soon. Please contact the office to let us know if you are likely to be away from e-mail in the near future. If you do not notify us and comments are not received within 5 days of sending the proof, we may publish the paper as it stands.

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On behalf of the Editor of Proceedings A, we look forward to your continued contributions to the Journal.

Sincerely,
Raminder Shergill
proceedingsa@royalsociety.org

on behalf of
Dr Earl Campbell
Board Member
Proceedings A

Appendix A

Dear Editor,

We thank the referees for reviewing our manuscript and for their positive assessment. Following the comments of Referee 2, we have extended the discussion of potential numerical investigations on the sphere.

To comply with the length requirements on the typeset paper we have combined the first two figures into one (as separate panels) and adjusted the size of the remaining figures. No changes to the content of the figures were made.

As requested, we have also split the Acknowledgements section into a separate section for Funding and the remainder of the Acknowledgements.

Yours sincerely,

Dmitry Chistikov, Olga Goulko, Adrian Kent, Mike Paterson