A performance degradation evaluation method for a turbocharger in a diesel engine

Xinjie Cui, Chuanlei Yang, Jose Ramon Serrano and Mingwei Shi

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Original submission: 11 July 2018
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Final acceptance: 18 October 2018

Review History
RSOS-181093.R0 (Original submission)

Review form: Reviewer 1

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No
Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept with minor revision (please list in comments)

Comments to the Author(s)
The authors proposed a performance degradation evaluation method for turbocharger in a diesel engine from the perspective of “gas-path diagnosis”, and the flow capacity index and the isentropic efficiency index as two dimensionless evaluation indicators for the turbocharger health status were firstly proposed. The case studies have illustrated that the method can accurately isolate the degraded components, and quantify the degradation for the components. The method proposed by the author has great potential application value for turbocharger diesel engine industry. The manuscript is well organized and is ready for publication with modification of written English throughout the paper to avoid grammatical errors.

Review form: Reviewer 2 (Georgios C. Mavropoulos)

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No

Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept as is

Comments to the Author(s)
The paper introduces for the first time the concept of gas-path diagnosis into the condition monitoring of marine turbocharger, and proposes two dimensionless evaluation indicators (i.e., the flow capacity index and the isentropic efficiency index) as turbocharger health parameters. The nonlinear mapping relationship between these health parameters and the gas-path measurable parameters of the turbocharger is studied, and a performance evaluation method of the turbocharger is developed. The proposed model is described and analyzed in detail and all the relevant equations are explained in clear inside the paper. The effectiveness of the proposed model is tested for three diagnostic cases for which experimental data are available in the literature. The results are very promising and reveal the
capacity of the proposed model to be used in real time condition monitoring since its necessary execution time is adequate for such applications. The discussion and explanations provided by the authors about the findings are quite analytical and sufficient, stand in the appropriate level and do not extend into useless details. Quality of graphs is very good and the reader of the paper obtains easily and quickly an overview of the findings of the investigation performed. The subject of this investigation is quite important for the present status of technological development in the area of turbochargers and falls inside the scope of the journal. Therefore the paper is suggested for publication without any modification.

Dr.-Ing. Georgios Mavropoulos
Senior Research Associate
National Technical Univ. of Athens
Greece

Decision letter (RSOS-181093.R0)

27-Sep-2018

Dear Dr Yang,

The editors assigned to your paper ("A performance degradation evaluation method for turbocharger in a diesel engine") have now received comments from reviewers. We would like you to revise your paper in accordance with the referee and Associate Editor suggestions which can be found below (not including confidential reports to the Editor). Please note this decision does not guarantee eventual acceptance.

Please submit a copy of your revised paper before 20-Oct-2018. Please note that the revision deadline will expire at 00.00am on this date. If we do not hear from you within this time then it will be assumed that the paper has been withdrawn. In exceptional circumstances, extensions may be possible if agreed with the Editorial Office in advance. We do not allow multiple rounds of revision so we urge you to make every effort to fully address all of the comments at this stage. If deemed necessary by the Editors, your manuscript will be sent back to one or more of the original reviewers for assessment. If the original reviewers are not available, we may invite new reviewers.

To revise your manuscript, log into http://mc.manuscriptcentral.com/rsos and enter your Author Centre, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision. Revise your manuscript and upload a new version through your Author Centre.

When submitting your revised manuscript, you must respond to the comments made by the referees and upload a file "Response to Referees" in "Section 6 - File Upload". Please use this to document how you have responded to the comments, and the adjustments you have made. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response.

In addition to addressing all of the reviewers' and editor's comments please also ensure that your revised manuscript contains the following sections as appropriate before the reference list:
• Ethics statement (if applicable)
If your study uses humans or animals please include details of the ethical approval received, including the name of the committee that granted approval. For human studies please also detail whether informed consent was obtained. For field studies on animals please include details of all permissions, licences and/or approvals granted to carry out the fieldwork.

• Data accessibility
It is a condition of publication that all supporting data are made available either as supplementary information or preferably in a suitable permanent repository. The data accessibility section should state where the article’s supporting data can be accessed. This section should also include details, where possible of where to access other relevant research materials such as statistical tools, protocols, software etc can be accessed. If the data have been deposited in an external repository this section should list the database, accession number and link to the DOI for all data from the article that have been made publicly available. Data sets that have been deposited in an external repository and have a DOI should also be appropriately cited in the manuscript and included in the reference list.

If you wish to submit your supporting data or code to Dryad (http://datadryad.org/), or modify your current submission to dryad, please use the following link: http://datadryad.org/submit?journalID=RSOS&manu=RSOS-181093

• Competing interests
Please declare any financial or non-financial competing interests, or state that you have no competing interests.

• Authors’ contributions
All submissions, other than those with a single author, must include an Authors’ Contributions section which individually lists the specific contribution of each author. The list of Authors should meet all of the following criteria; 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published. All contributors who do not meet all of these criteria should be included in the acknowledgements.

We suggest the following format:
AB carried out the molecular lab work, participated in data analysis, carried out sequence alignments, participated in the design of the study and drafted the manuscript; CD carried out the statistical analyses; EF collected field data; GH conceived of the study, designed the study, coordinated the study and helped draft the manuscript. All authors gave final approval for publication.

• Acknowledgements
Please acknowledge anyone who contributed to the study but did not meet the authorship criteria.

• Funding statement
Please list the source of funding for each author.

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submitted as part of our collaboration with the Royal Society of Chemistry (http://rsos.royalsocietypublishing.org/chemistry). If your manuscript is newly submitted and subsequently accepted for publication, you will be asked to pay the article processing charge, unless you request a waiver and this is approved by Royal Society Publishing. You can find out more about the charges at http://rsos.royalsocietypublishing.org/page/charges. Should you have any queries, please contact openscience@royalsociety.org.

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

Kind regards,
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Prof. R. Kerry Rowe (Subject Editor)
openscience@royalsociety.org

Associate Editor's comments:
Please respond to the comments of the referees, and seek advice on the written English as recommended (https://royalsociety.org/journals/authors/language-polishing/).

Comments to Author:

Reviewers' Comments to Author:
Reviewer: 1

Comments to the Author(s)
The authors proposed a performance degradation evaluation method for turbocharger in a diesel engine from the perspective of “gas-path diagnosis”, and the flow capacity index and the isentropic efficiency index as two dimensionless evaluation indicators for the turbocharger health status were firstly proposed. The case studies have illustrated that the method can accurately isolate the degraded components, and quantify the degradation for the components. The method proposed by the author has great potential application value for turbocharger diesel engine industry. The manuscript is well organized and is ready for publication with modification of written English throughout the paper to avoid grammatical errors.

Reviewer: 2

Comments to the Author(s)
The paper introduces for the first time the concept of gas-path diagnosis into the condition monitoring of marine turbocharger, and proposes two dimensionless evaluation indicators (i.e., the flow capacity index and the isentropic efficiency index) as turbocharger health parameters. The nonlinear mapping relationship between these health parameters and the gas-path measurable parameters of the turbocharger is studied, and a performance evaluation method of the turbocharger is developed. The proposed model is described and analyzed in detail and all the relevant equations are explained in clear inside the paper. The effectiveness of the proposed model is tested for three diagnostic cases for which experimental data are available in the literature. The results are very promising and reveal the capacity of the proposed model to be used in real time condition monitoring since its necessary execution time is adequate for such applications.
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Dr.-Ing. Georgios Mavropoulos
Senior Research Associate
National Technical Univ. of Athens
Greece

Author's Response to Decision Letter for (RSOS-181093.R0)
See Appendix A.

RSOS-181093.R1 (Revision)

Review form: Reviewer 1

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No

Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept as is

Comments to the Author(s)
The authors proposed a performance degradation evaluation method for turbocharger in a diesel engine from the perspective of “gas-path diagnosis”, and the flow capacity index and the isentropic efficiency index as two dimensionless evaluation indicators for the turbocharger health
status were firstly proposed. The case studies have illustrated that the method can accurately isolate the degraded components, and quantify the degradation for the components. The method proposed by the author has great potential application value for turbocharger diesel engine industry. The manuscript is well organized and is ready for publication without any modification.

Review form: Reviewer 2 (Georgios C. Mavropoulos)

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
Yes

Do you have any ethical concerns with this paper?
No

Have you any concerns about statistical analyses in this paper?
No

Recommendation?
Accept as is

Comments to the Author(s)
The paper in its present form is suggested for publication.

Decision letter (RSOS-181093.R1)

18-Oct-2018

Dear Dr Yang,

I am pleased to inform you that your manuscript entitled "A performance degradation evaluation method for turbocharger in a diesel engine" is now accepted for publication in Royal Society Open Science.

You can expect to receive a proof of your article in the near future. Please contact the editorial office (openscience_proofs@royalsociety.org and openscience@royalsociety.org) to let us know if you are likely to be away from e-mail contact. Due to rapid publication and an extremely tight schedule, if comments are not received, your paper may experience a delay in publication.
Royal Society Open Science operates under a continuous publication model (http://bit.ly/cpFAQ). Your article will be published straight into the next open issue and this will be the final version of the paper. As such, it can be cited immediately by other researchers. As the issue version of your paper will be the only version to be published I would advise you to check your proofs thoroughly as changes cannot be made once the paper is published.

On behalf of the Editors of Royal Society Open Science, we look forward to your continued contributions to the Journal.

Kind regards,
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Prof. R. Kerry Rowe (Subject Editor)
opencience@royalsociety.org

Associate Editor Comments to Author:
Congratulations on the acceptance of your paper.

Reviewer comments to Author:
Reviewer: 1

Comments to the Author(s)
The authors proposed a performance degradation evaluation method for turbocharger in a diesel engine from the perspective of “gas-path diagnosis”, and the flow capacity index and the isentropic efficiency index as two dimensionless evaluation indicators for the turbocharger health status were firstly proposed. The case studies have illustrated that the method can accurately isolate the degraded components, and quantify the degradation for the components. The method proposed by the author has great potential application value for turbocharger diesel engine industry. The manuscript is well organized and is ready for publication without any modification.

Reviewer: 2

Comments to the Author(s)
The paper in its present form is suggested for publication.

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Appendix A

Journal title: Royal Society Open Science
Manuscript title: A performance degradation evaluation method for turbocharger in a diesel engine

Dear editor,

Thank you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly, and the detailed corrections are listed below:

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author(s)
The authors proposed a performance degradation evaluation method for turbocharger in a diesel engine from the perspective of “gas-path diagnosis”, and the flow capacity index and the isentropic efficiency index as two dimensionless evaluation indicators for the turbocharger health status were firstly proposed. The case studies have illustrated that the method can accurately isolate the degraded components, and quantify the degradation for the components. The method proposed by the author has great potential application value for turbocharger diesel engine industry. The manuscript is well organized and is ready for publication with modification of written English throughout the paper to avoid grammatical errors.

Answer: We have modified the written English throughout the paper, thanks for your advise!

Reviewer: 2

Comments to the Author(s)
The paper introduces for the first time the concept of gas-path diagnosis into the condition monitoring of marine turbocharger, and proposes two dimensionless evaluation indicators (i.e., the flow capacity index and the isentropic efficiency index) as turbocharger health parameters. The nonlinear mapping relationship between these health parameters and the gas-path measurable parameters of the turbocharger is studied, and a performance evaluation method of the turbocharger is developed. The proposed model is described and analyzed in detail and all the relevant equations are explained in clear inside the paper. The effectiveness of the proposed model is tested for three diagnostic cases for which experimental data are available in the literature. The results are very promising and reveal the capacity of the proposed model to be used in real time condition monitoring since its necessary execution time is adequate for such applications.
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Answer: thanks for your reviewing!