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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Hydrodynamic lubrication of textured journal bearing considering slippage: Two-dimensional CFD analysis using multiphase cavitation model		
Jumlah Penulis	:	4 orang (**M. Tauviqirrahman**, A. Pratama, Jamari, Muchammad)		
Status Pengusul	:	Penulis Pertama sekaligus Penulis Korespondensi		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	Tribology in Industry
		b. Nomor ISSN	:	0354-8996 (print version); 2217-7965 (online version)
		c. Vol, No., Bln Thn	:	Volume 41, Issue 3, 2019, Hal. 401-415
		d. Penerbit	:	University of Kragujevac, Serbia
		e. DOI artikel (jika ada)	:	https://doi.org/10.24874/ti.2019.41.03.10
		f. Alamat web jurnal	:	http://www.tribology.rs/journals/2019/2019-3/2019-3-10.html
		Alamat Artikel	:	http://www.tribology.rs/journals/2019/2019-3/10.pdf
		g. Terindex	:	Scopus, Q3

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Nilai Pengusul = 60% x 39,00 = 23,40			

Semarang, 28 April 2020

Reviewer 1

Ir. Eflita Yohana, M.T., Ph.D
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Unit Kerja : Departemen Teknik Mesin FT UNDIP

Reviewer 2

Ojo Kurdi, S.T., M.T., Ph.D
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b. Ruang lingkup dan kedalaman pembahasan (30%)	12,00				11,00
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	12,00				12,00
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12,00				12,00
Total = (100%)	**40,00**				**39,00**
Nilai Pengusul (kontribusi pengusul penulis) = 60% x = 39,00 = 23,40					

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   Template penulisan artikel sudah memenuhi persyaratan dari jurnal "Tribology in Industry". Bagian-bagian penyusun artikel seperti Judul, Abstrak, Pendahuluan, Metode, Hasil dan Pembahasan, Kesimpulan, Daftar Pustaka disusun runut dan isi ditulis sesuai dengan panduan jurnal. Artikel yang ditulis juga sesuai dengan bidang kajian ilmu pengusul, yaitu Teknik Mesin. Nilai (4)
2. **Ruang lingkup dan kedalaman pembahasan:**
   Artikel ini membahas tentang modifikasi *journal bearing* dengan memberikan tekstur dan material hydrophobic untuk menciptakan fenomena slip. Kasus dipecahkan dengan menggunakan metode numerik. Pembahasan ditulis secara lengkap dengan membahas banyak aspek pelumasan. Ruang lingkup aplikasi mekanika fluida lanjut untuk pelumasan dalam artikel ini menjadi hal yang menarik untuk dibaca. Meskipun demikian, skop penelitian masih tentang simulasi, sehingga perlu dibandingkan dengan hasil eksperimen. Nilai (11)
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Artikel ini memuat lebih dari 65 % pustaka yang disitasi merupakan pustaka terkini (kurang dari 10 tahun). Metodologi yang meliputi persamaan-persamaan umum matematis, pengaturan solusi, pemodelan-pemodelan fisik dijelakan runut dan lengkap sehingga bisa diikuti orang lain. Kemutkhiran data hasil penelitian yang disajikan sangat informatif. Turnitin similarity index hanya 13%. Nilai (12).
4. **Kelengkapan unsur dan kualitas terbitan:**
   Unsur-unsur jurnal bereputasi tinggi telah terpenuhi. Editorial board yang diisi oleh orang-orang yang berkompeten. Jurnal ini merupakan jurnal internasional bereputasi Q3 dengan SJR (2018) = 0.291.

Semarang, 11 Maret 2020
Reviewer 1

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b. Ruang lingkup dan kedalaman pembahasan (30%)	12,00				12,00
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	12,00				11,00
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12,00				12,00
Total = (100%)	**40,00**				**39,00**
Nilai Pengusul (kontribusi pengusul penulis) = 60% x 39,00 = 23,40					

Catatan Penilaian artikel oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi jurnal:**
   Artikel sudah sesuai dengan template jurnal *Tribology in Industry* yaitu terdiri dari Judul, Abstrak, Pendahuluan, Metode, Hasil dan Pembahasan, Kesimpulan, Ucapan terima kasih, dan Referensi. Artikel telah sesuai dengan bidang ilmu penulis, yaitu Teknik Mesin.
2. **Ruang lingkup dan kedalaman pembahasan:**
   Isi artikel berkaitan dengan pengaruh tekstur dan slip terhadap performa pelumasan pada *journal bearing* dengan simulasi berbasis perangkat lunak. Data hasil penelitian seperti karakteristik dan performa pelumasan dibahas secara komprehensif. Fenomena fisik yang ada juga dianalisis secara detil, yang mencirikan penulis memiliki kepakaran yang teruji. Untuk setiap gambar dan kontur yang ditampilkan, selalu disertai dengan pembahasan yang panjang lebar dan detil. Hubungan parameter yang satu dengan yang lain juga dibahas secara lengkap.
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Artikel ini memiliki orisinalitas dan keterbaruan ide yang cukup baik karena mempertimbangkan kavitasi *multi-phase* dalam analisis bantalan bertekstur. Sebanyak 23 dari 35 sitasi merupakan kategori baru (kurang dari 10 tahun terakhir). Kemutakhiran informasi cukup baik karena *post-processing* hasil simulasi yang dilakukan menampilkan kontur-kontur fenomena fisik secara representattif . Metodologi dijelaskan sangat runut dan lengkap. *Turnitin similarity index* = 13%.
4. **Kelengkapan unsur dan kualitas terbitan:**
   Jurnal ini tergolong Jurnal Internasional bereputasi (Q3) dengan lingkup khusus Tribology dan terindeks Scopus dengan SJR (2018)= 0.291. Review terhadap artikel ini juga dilakukan secara ketat.

Semarang, 19 April 2020
Reviewer 2

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Hydrodynamic lubrication of textured journal bearing considering slippage: Two-dimensional CFD analysis using multiphase cavitation model (Article)

(Open Access)

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Save all to author list

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Abstract

View references (35)

Partial texturing of the surface of journal bearings have been proven very beneficial in terms of friction coefficient. In the present work, the load support of the hydrodynamic textured journal bearing combined with artificial slippage is fully characterized by means of computational fluid dynamics (CFD) simulations based on the numerical solution of the Navier–Stokes equations for incompressible flow. In order to model slippage, the enhanced user-defined-function (UDF) code is developed. Realistic boundary condition is employed by implementing the mixture multiphase model to model a cavitation in the bearing. The numerical analysis is performed under the condition of different groove depths, eccentricity ratios and slippage placements along the textured area of bearing. The simulation results including hydrodynamic pressure and load support are gained and compared for conventional smooth parameters. A reference to determine optimal groove depths as well as best artificial slippage placement of textured bearing under different conditions of loading are proposed. Based on the present results, favorable slippagetextured journal bearing design can be assessed. © 2019 Published by Faculty of Engineering.

Author keywords

Cavitation | Computational fluid dynamics (CFD) | Slippage | Texturing

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Tribology in Industry

16

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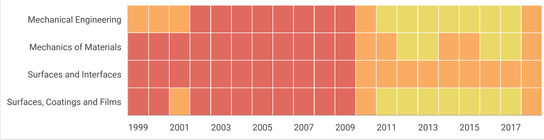

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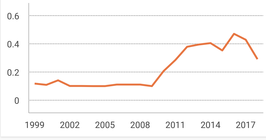

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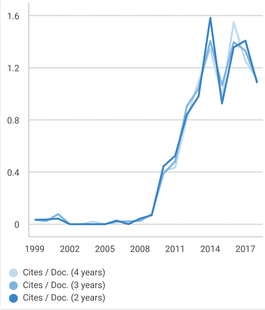

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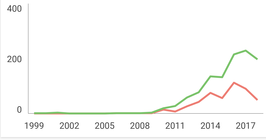

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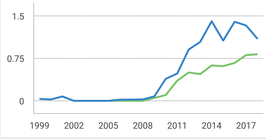

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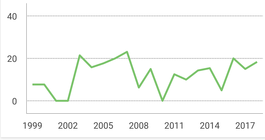

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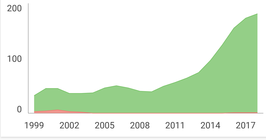

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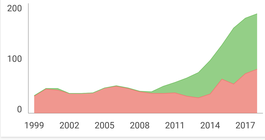

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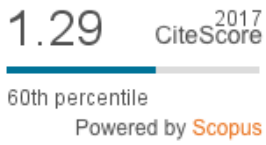

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RESEARCH

Fundamental Study on No-lubricating Friction Characteristics Due to Anisotropy of Surface Properties Applied to Differential Gear

Y. Ebisuno[a], Y. Sato[b], M. Fukumoto[b]

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[b]*Department of Mechanical Engineering, Toyohashi University of Technology, Japan.*

Keywords:

Friction
Surface roughness
Anisotropic roughness
Crease direction
No lubrication

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A B S T R A C T

The solid frictional characteristics of surface roughness in combination with anisotropy were systematically investigated through linear reciprocating sliding tests on planar surfaces with no lubrication. Four types of test pieces with anisotropy and varying amounts of surface roughness controlled by polishing were prepared. For test pieces #800 and #3000, their friction coefficients did not change significantly based on anisotropic combination conditions and remained relatively constant at 0.35. In contrast, for test pieces #80 and #150, their friction coefficients changed significantly based on anisotropic combination conditions. Their friction coefficients were approximately 0.45 when their crease directions were parallel and sliding directions were orthogonal, approximately 0.3 when their crease directions and sliding directions were both parallel, and approximately 0.15 when their crease directions were orthogonal and sliding direction were parallel. Therefore, the anisotropic combination conditions in which test pieces #80 and #150 had orthogonal crease directions and parallel sliding directions yielded the smallest friction coefficient.

1. INTRODUCTION

In recent years, improving the fuel economy of vehicles has become a major social issue from the perspective of protection of the global environment. The proportion of friction loss in fuel consumption is particularly high. Therefore, realizing the reduction of friction loss has become an important technical issue [1,2]. In the differential gear automobile component, which is one of the main products manufactured by the organization with which one of the authors is affiliated, the pinion gear and the shaft that supports it work under heavy loads at low velocity, subjecting them to severe sliding conditions as a result of solid materials contacting each other. In the worst-case scenario, seizure may occur due to severe contact conditions the same as no lubrication. Although measures incorporating optimization of surface conditions are being investigated to remedy such issues, such methods are still based on experience and

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RESEARCH

Influence of the Number of Bilayers on the Mechanical and Tribological Properties in [TiN/TiCrN]n Multilayer Coatings Deposited by Magnetron Sputtering

C.H. Ortiz[a], H.D. Colorado[b], W. Aperador[c], A. Jurado[a]

[a] *School of Materials Engineering, Universidad del Valle, Cali, Colombia,*
[b] *Physics department , Universidad del Valle, Cali, Colombia,*
[c] *Universidad Militar Nueva Granada, Bogotá, Colombia.*

Keywords:

Magnetron sputtering
Coatings
Mechanical properties
Friction coefficient
Electrochemical properties

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A B S T R A C T

In this work the influence of the number of bilayers was studied on the mechanical, tribological and electrochemical properties of multilayer coatings [TiN / TiCrN]n as a function of the number of bilayers n = 1, 25 and 50, deposited by magnetron sputtering. By X-ray diffraction (XRD), a cubic crystal structure centered on the faces (FCC) was determined for all coatings and an increase in the compressive stresses that were generated during the deposition process was found by perfilometry; Atomic force microscopy (AFM) determined that by increasing the number of bilayers, the roughness decreased, due to an increase in the density of the system. By nanoindentation it was found that the hardness (H) and the modulus of elasticity (E) increased as the number of bilayers did. By Pin on disk a decrease in the coefficient of friction was observed as the number of bilayers was increased, which was related to the increase in hardness and the reduction of roughness. The results of EIS and Tafel for the electrochemical properties, determined that the corrosion rate decreased due to the fact that a greater barrier to the passage of the electrolyte towards the substrate is promoted when the number of bilayers increases.

1. INTRODUCTION

The phenomena of friction and wear produce a large amount of losses within the manufacturing industry, generating higher costs within the production process, as well as negative effects on the productivity and competitiveness of these companies. [1]. The engineering of surfaces arises as a solution to this problem, more specifically surface treatments such as hard coatings, which are obtained by means of techniques such as PVD, CVD and others [2].

Vol. 41, No. 3 (2019) 365-374, DOI: 10.24874/ti.2019.41.03.06

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RESEARCH

The Effect of the Different Percentage of Pour Point Depressant (PPD) On the Tribological Properties of Palm Kernel Oil

M.A. Dandan[a], A. Yahaya[a], S. Syahrullail[a]

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Keywords:

Wear
Friction
Tribology
Palm Kernel Oil
Anti-oxidant
Extreme Pressure

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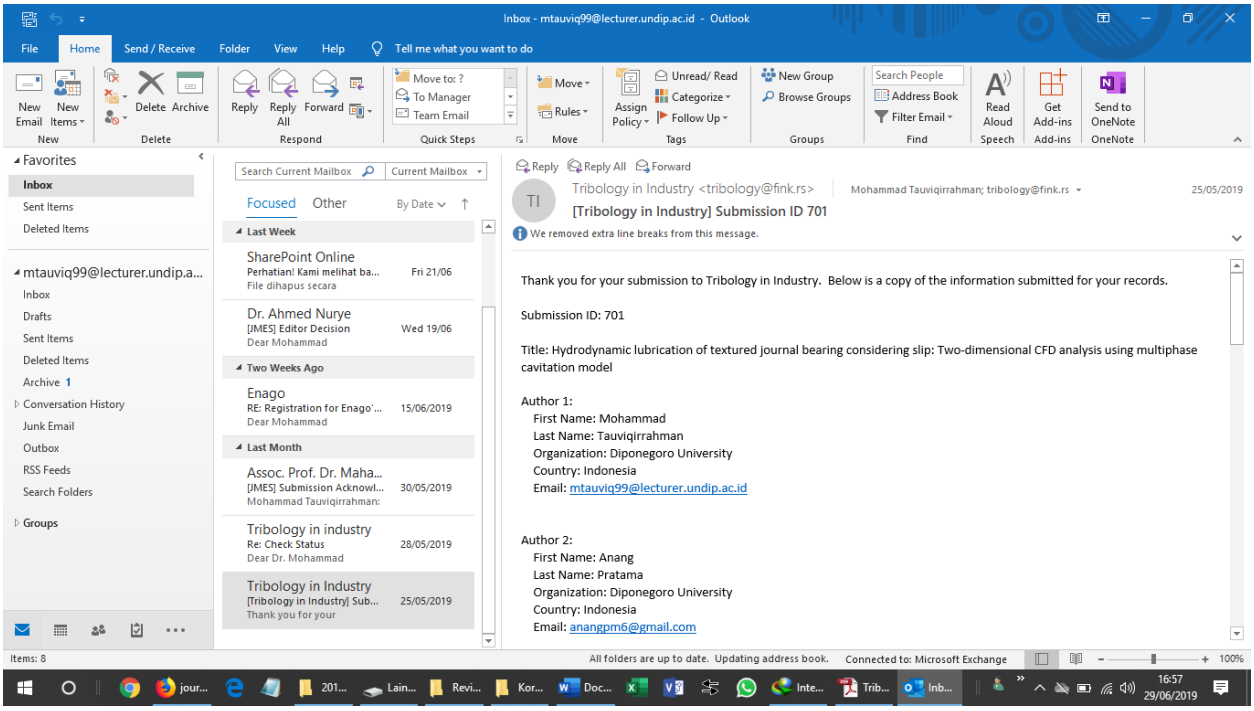
A B S T R A C T

A research has been done to investigate the tribological performance of palm kernel oil (PKO) with addition of different percentage of pour point depressant, PPD (5w%, 10wt%, 20wt% and 30wt%) according to ASTM D2783. The main analyses that have been done in this research are low temperature performance ability of blended PKO, coefficient of friction (COF), wear scar diameter (WSD) and surface profile. The result of the experiment has shown that for low temperature performance, PKO with 20wt%PPD (A2-20%) and 30wt%PPD (A2-30%) show great performance in withstanding lower temperature (15 ℃). Under extreme pressure test, it can be seen that PKO can only withstand lower load (110kg) compared to mineral oil (140 kg). The sample 10wt%PPD (A2-10%) shows good lubricity performance in terms of COF as compared to other sample. 5wt%PPD (A2-5%) and 10wt%PPD show good lubricity performance in terms of anti-wear behaviour (A2-10%) by producing the lowest WSD when compared to other samples. From overall view, PPD is considered as successful in improving low temperature performance of PKO, but in terms of lubricity performance, adding PPD will slightly reduce the lubricity performance under extreme pressure if compared to pure PKO.

1. INTRODUCTION

The research and development of alternative renewable lubricant that was prompted by the depleting trend of conventional and non-renewable petroleum-based products had led to the discovery of the vegetable-based oil products as being one of the most promising alternative and renewable sources [1-3]. Since the vegetable oils had not only demonstrated a superior biodegradability level, but also unique properties that were different from those of the mineral oil, numerous investigations were thus conducted on these oils (sunflower, castor, soybean, rapeseed and palm) as alternative lubricants for industrial and transportation applications and feedstock in biodiesel production [4-7].

1. Submission confirmation
25 Mei 2019
(Balasan dari Editor setelah Submit I)



Thank you for your submission to Tribology in Industry. Below is a copy of the information submitted for your records.

Submission ID: 701

Title: Hydrodynamic lubrication of textured journal bearing considering slip: Two-dimensional CFD analysis using multiphase cavitation model

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Topic(s):
- Surface engineering

- Tribological design

Keywords: Cavitation, Computational fluid dynamic (CFD), Slippage, Texturing

Abstract: Partial texturing of the surface of journal bearings have been proven very beneficial in terms of friction coefficient. In the present work, the load support of the hydrodynamic textured journal bearing combined with artificial slippage is fully characterized by means of computational fluid dynamics (CFD) simulations based on the numerical solution of the Navier–Stokes equations for incompressible flow. In order to model slippage, the enhanced user-defined-function (UDF) code is developed. Realistic boundary condition is employed by implementing the mixture multiphase model to model a cavitation in the bearing. The numerical analysis is performed under the condition of different groove depths, eccentricity ratios and slippage placements along the textured area of bearing. The simulation results including hydrodynamic pressure and load support are gained and compared for conventional smooth parameters. A reference to determine optimal groove depth as well as best artificial slippage placement of textured bearing under different conditions of loading are proposed. Based on the present results, favorable slippage-textured journal bearing design can be assessed.

Comments: M. Tauviqirrahman
Laboratory for Engineering Design and Tribology Department of Mechanical Engineering, Diponegoro University Jl. Prof. Soedharto, SH., Semarang, Central Java 50275, Indonesia.
E-mail: mtauviq99@lecturer.undip.ac.id

May 25, 2019
Slobodan Mitrović
Faculty of Engineering, University of Kragujevac, Kragujevac, Serbia Editor-in-Chief Tribology in Industry

Dear Dr. Mitrovic

Enclosed please find the manuscript entitled: Hydrodynamic lubrication of textured journal bearing considering slip: Two-dimensional CFD analysis using multiphase cavitation model submitted for publication in Tribology in Industry. The authors are: Mohammad Tauviqirrahman, Anang Pratama, Jamari, Muchammad.

The basic findings are as follows.

1. The simulation results show that the higher the eccentricity ratio, the lower the positive effect of introduction of texturing. This prevails both for the purely textured bearing and the slippage textured one.
2. In the case of purely textured bearing, the optimum groove depth exists to a achieve the maximum load support. For a purely textured journal bearing with given eccentricity ratio, the groove depth which is equal to minimum film thickness results in the highest additional load support.
3. In the case of a combination of slippage and texturing, a well-chosen placement of the artificial slippage condition on textured zone of the bearing has more positive effect with respect to the load support, compared to purely textured surface. Introducing the slippage boundary on all groove edges of textured area leads to a significant enhancement in load support.

4. The positive effect of the slippage-textured bearing would have been more significant in enhancing the tribological performance if a relatively shallow groove depth has been used. This finding may have useful implications for enhancing the additional load support.

This is an original paper which has neither previously, nor simultaneously, in whole or in part been submitted anywhere else.

Kind regards,

M. Tauviqirrahman

May 25, 2019

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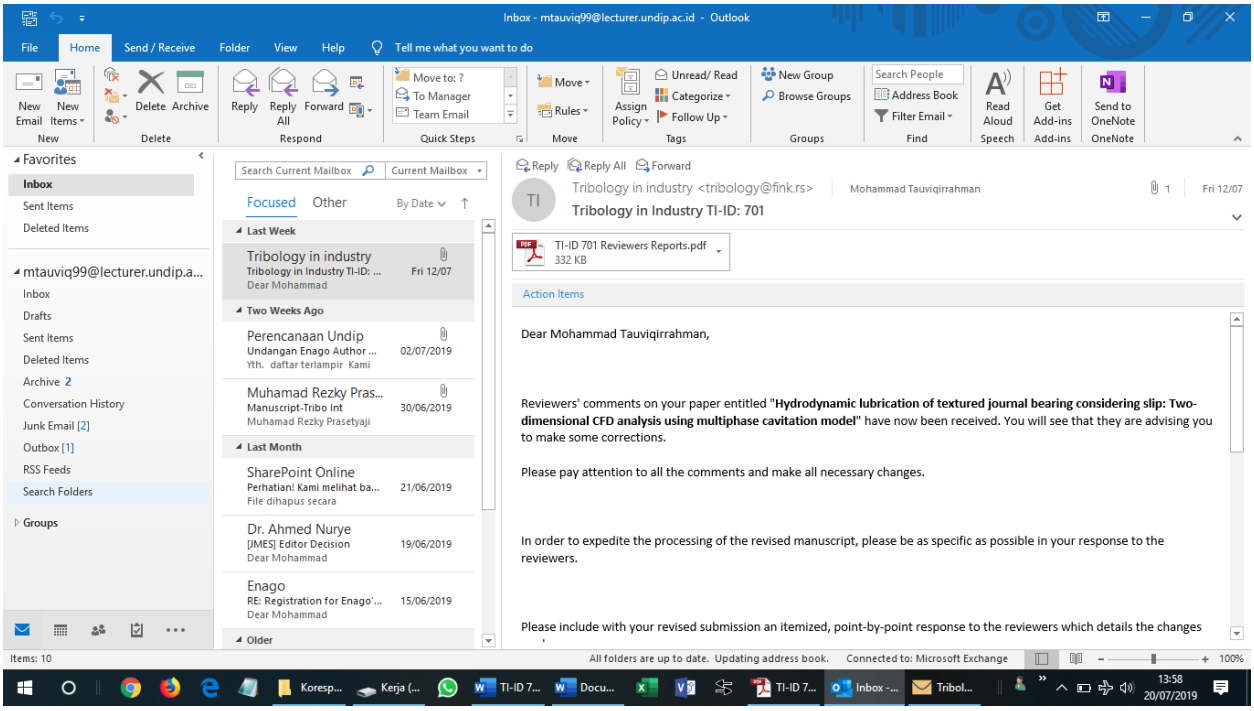
2. Revision (1st round)

Friday, 12 July 2019



Dear Mohammad Tauviqirrahman,

Reviewers' comments on your paper entitled "**Hydrodynamic lubrication of textured journal bearing considering slip: Two-dimensional CFD analysis using multiphase cavitation model**" have now been received. You will see that they are advising you to make some corrections.

Please pay attention to all the comments and make all necessary changes.

In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewers.

Please include with your revised submission an itemized, point-by-point response to the reviewers which details the changes made.

Please feel free to contact the Editorial Office with any questions or concerns.

Best regards,

Dragan Dzunic

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Journal of Serbian Tribology Society

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Manuscript ID: **701**

Paper Submitted for Reviewing: 25.05.2019.

Paper Returned from Reviewing: 12.07.2019.

Reviewers Reports

Corresponding authors: Mohammad Tauviqirrahman mtauviq99@lecturer.undip.ac.id

Paper title: **Hydrodynamic lubrication of textured journal bearing considering slip: Two-dimensional CFD analysis using multiphase cavitation model**

Reviewer 1:

This paper is a CFD study of a textured journal bearing considering slip surface. The analysis is 2D and assumes an isothermal lubricant. The subject is relevant and is scientifically well conducted.

1. While the Reynolds number is in the laminar range, it is not clear why a turbulence model has been used. Why was it necessary?
2. Grooves are located from θ_i = 122° similarly to ref. [4] as they resulted in a reduction of friction coefficient. However, this work focuses exclusively on load support performance and not on friction. In that regards, grooves may not be placed in the optimal zone in terms of improving the load support.
3. The bearing was modelled as a cosine profile with inlet and outlet boundaries. In my opinion, this condition doesn't represent accurately the flow in the corresponding 360° journal bearing. Indeed, it doesn't guarantee that velocity profiles and pressure gradients at the inlet and outlet are the same. How is the inlet velocity profile calculated (if not equal to the outlet one)? Also, how is the load carrying capacity computed? Is it calculated in cylindrical coordinates like in Fig 1(a)? Since the geometry is 2D the dimension of the load support in Fig. 11 should be in [N/m].
4. Could you specify the number of cells used across the film and inside the grooves?
5. An optimal groove depth giving the highest additional load support compared to the smooth bearing was determined to be equal to the minimum film thickness. An additional load support will, in reality, decrease the eccentricity ratio, change the attitude angle and increase the minimum film. Thus, the optimal groove depth related to the minimum film is no longer an optimum.

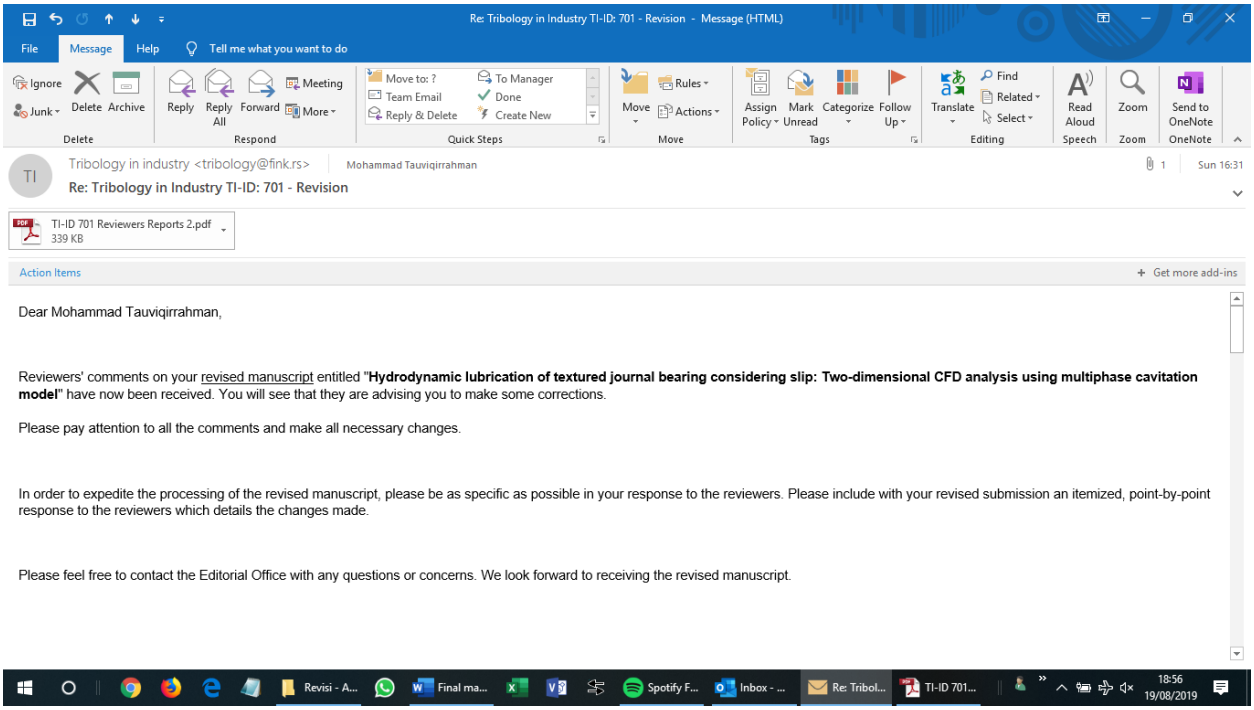
6. Which vapour pressure value was chosen? From Fig. 4 it seems that there is a little difference in the cavitation zone.
7. A lot of the result part consists in describing the results. It would be interesting to include more explanations of the phenomena. In particular, why is the texturing more effective at low eccentricity ratio? How does the slippage work and how does it generate a pressure rise?
8. It is shown that texturing with the shallowest grooves and with full slip gives the best increase in load support for the 3 eccentricities tested. One can then wonder if d = 0 would give even better results, i.e. when the grooves are replaced by slippage only? This could be an interesting test to include.

Reviewer 2:

1. The boundary conditions of the lubricant film are not clearly stated. The boundary conditions should be clearly noted on Fig.1 or Fig.2.
2. In fig.8, the legends is not clear.

3. Revision (2nd round)

19 Agustus 2019



Dear Mohammad Tauviqirrahman,

Reviewers' comments on your revised manuscript entitled "**Hydrodynamic lubrication of textured journal bearing considering slip: Two-dimensional CFD analysis using multiphase cavitation model**" have now been received. You will see that they are advising you to make some corrections.

Please pay attention to all the comments and make all necessary changes.

In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewers. Please include with your revised submission an itemized, point-by-point response to the reviewers which details the changes made.

Please feel free to contact the Editorial Office with any questions or concerns. We look forward to receiving the revised manuscript.

Best regards,

Dragan Dzunic

Editor Assistant

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On Tue, Jul 23, 2019 at 1:00 PM Tribology in industry <tribology@fink.rs> wrote:

Dear Mohammad Tauviqirrahman,

Thank you for sending us corrected manuscript.

You will be notified of the Editorial Board's decision regarding its publication as soon as the review process has been completed.

Best regards,

Dragan Dzunic

Editor Assistant

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Paper Submitted for Reviewing: 25.05.2019.

Paper Returned from Reviewing: 18.08.2019.

Reviewers Reports

Corresponding authors: Mohammad Tauviqirrahman mtauviq99@lecturer.undip.ac.id

Paper title: **Hydrodynamic lubrication of textured journal bearing considering slip: Two-dimensional CFD analysis using multiphase cavitation model**

Reviewer 1:

Thank you for your revisions and your relevant explanations. Referring to my previous comments I still have a few points to clarify.

- Point 3: To my understanding, the pressure is integrated according to the y-direction of Fig. 2. Doing so is equivalent to integrate the pressure according to the r-direction of Fig 1a. It is then not correct since the obtained load does not have a specific direction. For example, at very low eccentricity (as it is almost the case in Fig. 5), a smooth bearing would give a load support of 0 (a perfect sine function) whereas the load for the corresponding "real" geometry would be different than 0.
- Point 4: I was referring to the number of cells in the film thickness, i.e. in the y-direction in Figure 2.
- Point 7: I suppose Fig. 14 represents the velocity (but it is not streamlines). Since you refer to a recirculation zone, it would be useful to have a scale or a contour line showing where the negative velocity occurs. There is also a misspelling at the beginning of the added text in section 2.2

Reviewer 2:

1. In section 3.2 (pure texturing), Fig. 8 shows significant improvement in load capacity for eccentricity ratio of 0.2, compared to eccentricity ratios of 0.5 and 0.8 respectively. However, Fig. 5 shows similar magnitude distributions in pressure for plain and textured bearings.
2. In section 3.3 (slip texturing), Fig. 10 (a) and (b) for different groove depths, pressure distribution profile shows different characteristics for "no slip" and "slip gap" criteria.

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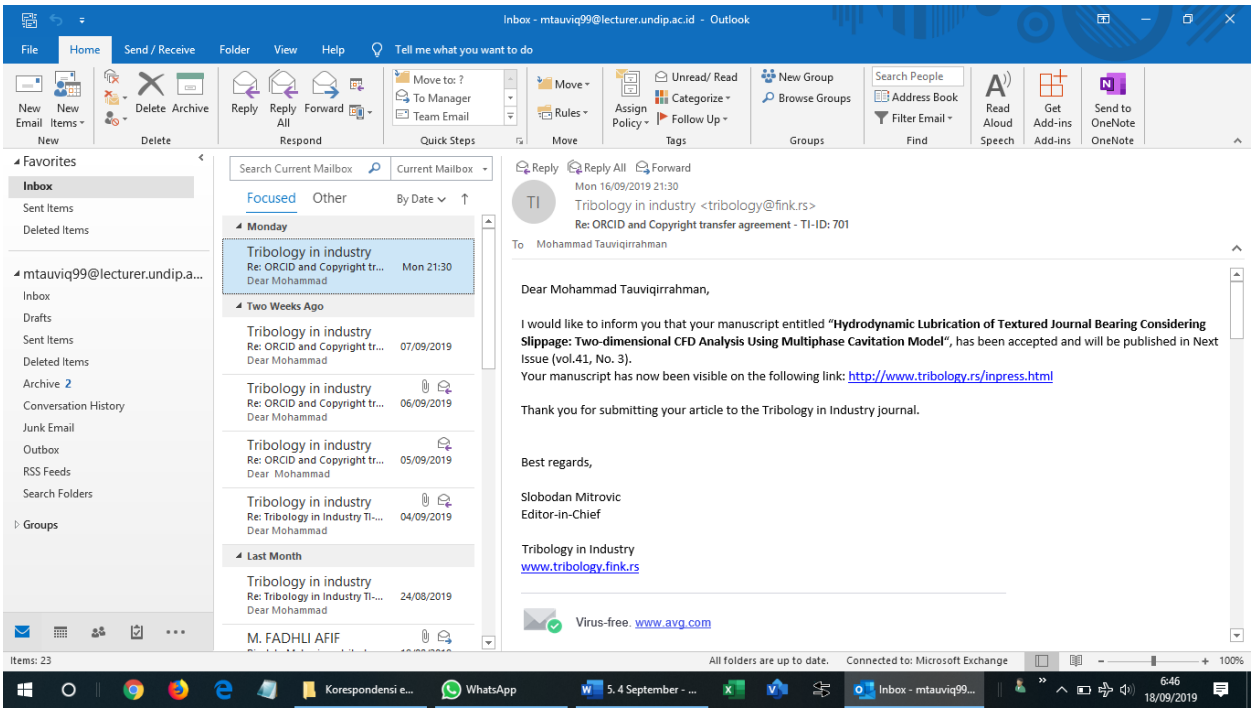

Dear Mohammad Tauviqirrahman,

I would like to inform you that your manuscript entitled "**Hydrodynamic Lubrication of Textured Journal Bearing Considering Slippage: Two-dimensional CFD Analysis Using Multiphase Cavitation Model**", has been accepted and will be published in Next Issue (vol.41, No. 3).
Your manuscript has now been visible on the following link: http://www.tribology.rs/inpress.html

Thank you for submitting your article to the Tribology in Industry journal.

Best regards,

Slobodan Mitrovic

Editor-in-Chief

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