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Volume 354 (2026), p. 801-806

Online since: 14 September 2026

<https://doi.org/10.5802/crmeca.382>



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Erratum

Erratum to: “Hydrodynamic lubrication study of plain journal bearings lubricated with couple stress fluids: surface texture effects” [*C. R. Méc.* **354** (2026), pp. 71–87, doi: 10.5802/crmeca.347]

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Abstract. Errors and inconsistencies were identified in the references, numerical implementation, and formulation of our recently published article. These issues concern the dimensionless definition of the texture amplitude, the Sommerfeld number reported in Table 1, and the geometric parameter notation. Consequently, all numerical simulations presented in the original article were recalculated using the corrected implementation. The corresponding graphical results and interpretations were systematically reevaluated.

Keywords. Hydrodynamic lubrication, Hydrodynamic bearing, Couple stress fluid, Non-Newtonian fluid, Surface texture.

Manuscript received 31 July 2026, revised 16 August 2026, accepted 18 August 2026, online since 14 September 2026.

1. Lubricant film profile

The lubricating film profile (Figure 2) did not reproduce the geometry defined by the theoretical formulation due to an error in the summation of the Fourier series terms. The corrected version of Figure 2 is provided below and replaces the corresponding figure in the original article.

2. Correction of the geometric parameter

The geometric ratio ($R/L = 0.5$) should be replaced by the conventional ($L/D = 1$) ratio throughout the manuscript.

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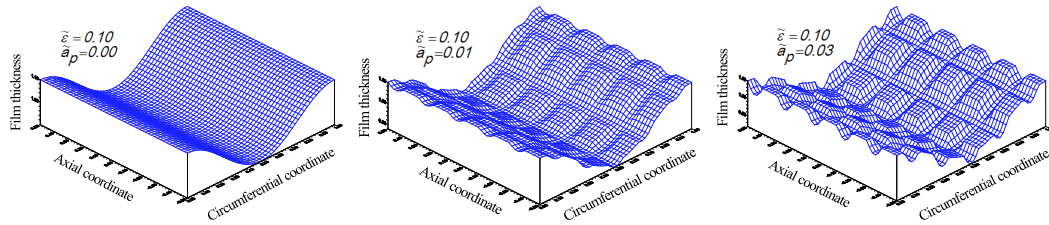


Figure 2. Lubricant film profile obtained for different values of asperity amplitude.

Table 1. Comparison of theoretical results obtained for a journal bearing of finite length ($L/D = 1$)

$\tilde{\varepsilon}$	0.0962	0.5374	0.8349	
S	1.3540	0.1549	0.0345	Reference results
	1.35970	0.1555	0.0352	Present work
ϕ (deg.)	84.03	56.07	33.03	Reference results
	84.09	56.18	33.52	Present work

3. Validation

A numerical error was identified in Table 1 of the original article concerning the Sommerfeld number. For $\varepsilon = 0.0962$, the value was incorrectly reported as 1.03540 instead of the correct value of 1.3540. The corrected Table 1 is presented below and replaces the corresponding table in the original article.

Following the correction of the Sommerfeld number in Table 1, good agreement is obtained between the present results and the reference data of Constantinescu V. N. et al. at low eccentricity. Consequently, the previous interpretation of the reported deviation is no longer applicable.

4. Texture amplitude

The texture amplitude was incorrectly dimensionless in the calculation code using the minimum lubricant film thickness ($h_{\min} = C(1 - \varepsilon)$) instead of the radial clearance (C). This implementation error introduced a multiplicative factor $(1 - \varepsilon)$, which varies from 0.1 to 0.9 depending on the eccentricity ratio.

The correction consists of replacing, in the computational code, the erroneous definition ($\tilde{a}_p = a_p/h_{\min}$) with the correct definition ($\tilde{a}_p = a_p/C$), as defined in the original theoretical formulation. Thus, the amplitude of the texture is independent of the eccentricity ratio ε .

Consequently, the texture amplitudes reported in the original article (0.10, 0.20, 0.30, and 0.35) are replaced by the corrected values (0.01, 0.02, 0.03, and 0.035), respectively. These values correspond to the real texture amplitudes generated by the original implementation at the most severe operating condition, $\varepsilon = 0.9$, for which the erroneous factor $(1 - \varepsilon) = 0.1$ was introduced.

All numerical results have been recalculated using the corrected implementation.

The figures presented in this erratum replace the corresponding figures published in the original article.

The recalculated results show that the lubricant rheology has no significant effect on the side leakage flow (Figure 5d), except at high relative eccentricity ratios, particularly for larger texture amplitudes, where its influence becomes slightly more pronounced. Furthermore, an increase in the texture amplitude results in a higher side leakage flow, which promotes an adequate lubricant supply to the contact region and helps maintain a stable and continuous lubricating film.

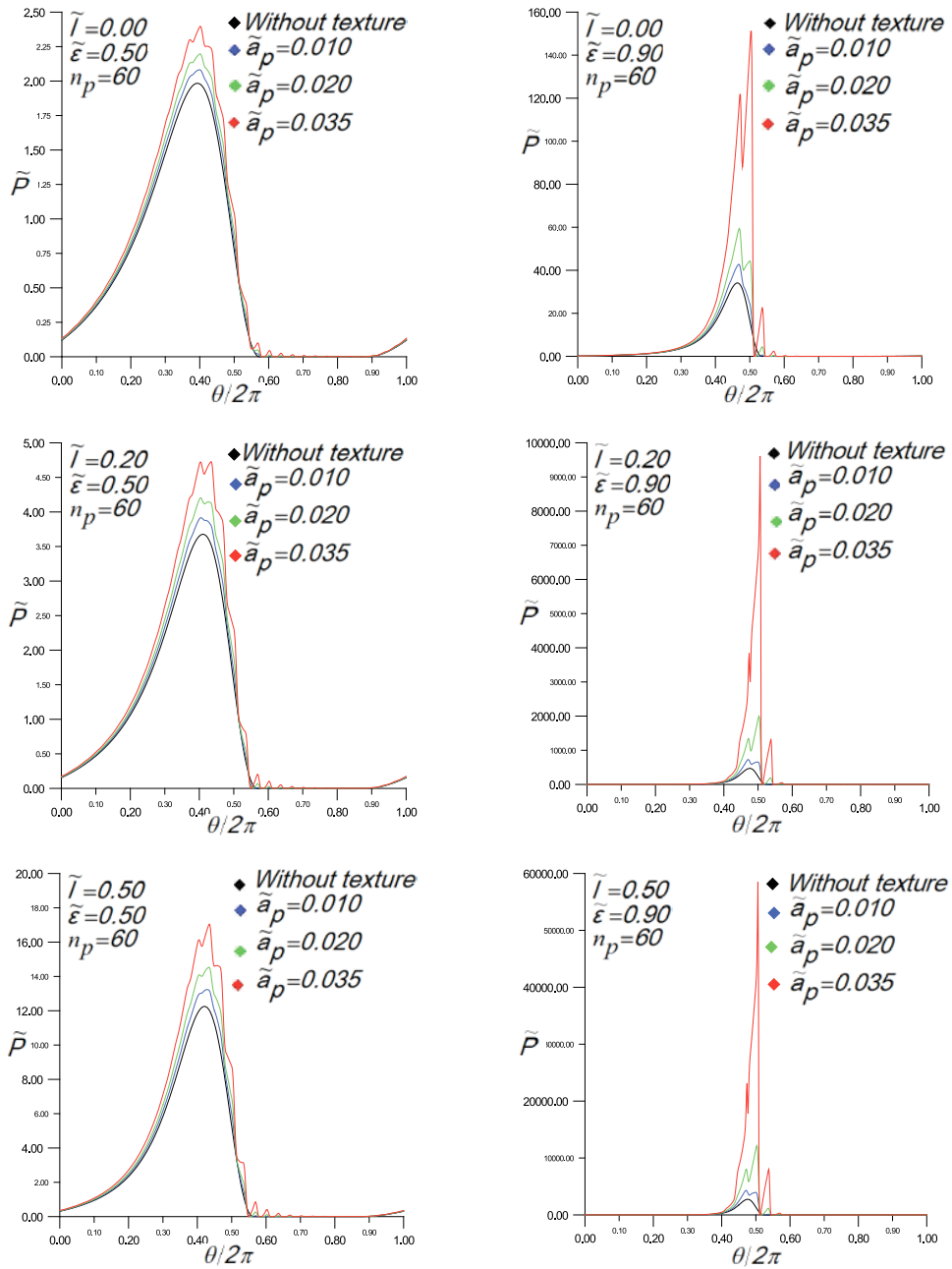


Figure 3. Circumferential static pressure in journal bearing for different value of $\tilde{a}_p$ and $\tilde{l}$.

For the other quantities investigated, such as: pressure, load-carrying capacity, friction factor, and attitude angle, the implemented corrections affect only the quantitative values, while the qualitative trends remain unchanged.

Consequently, the interpretation of the side leakage flow results has been revised, whereas the physical interpretations and main conclusions associated with the other investigated quantities remain unchanged.

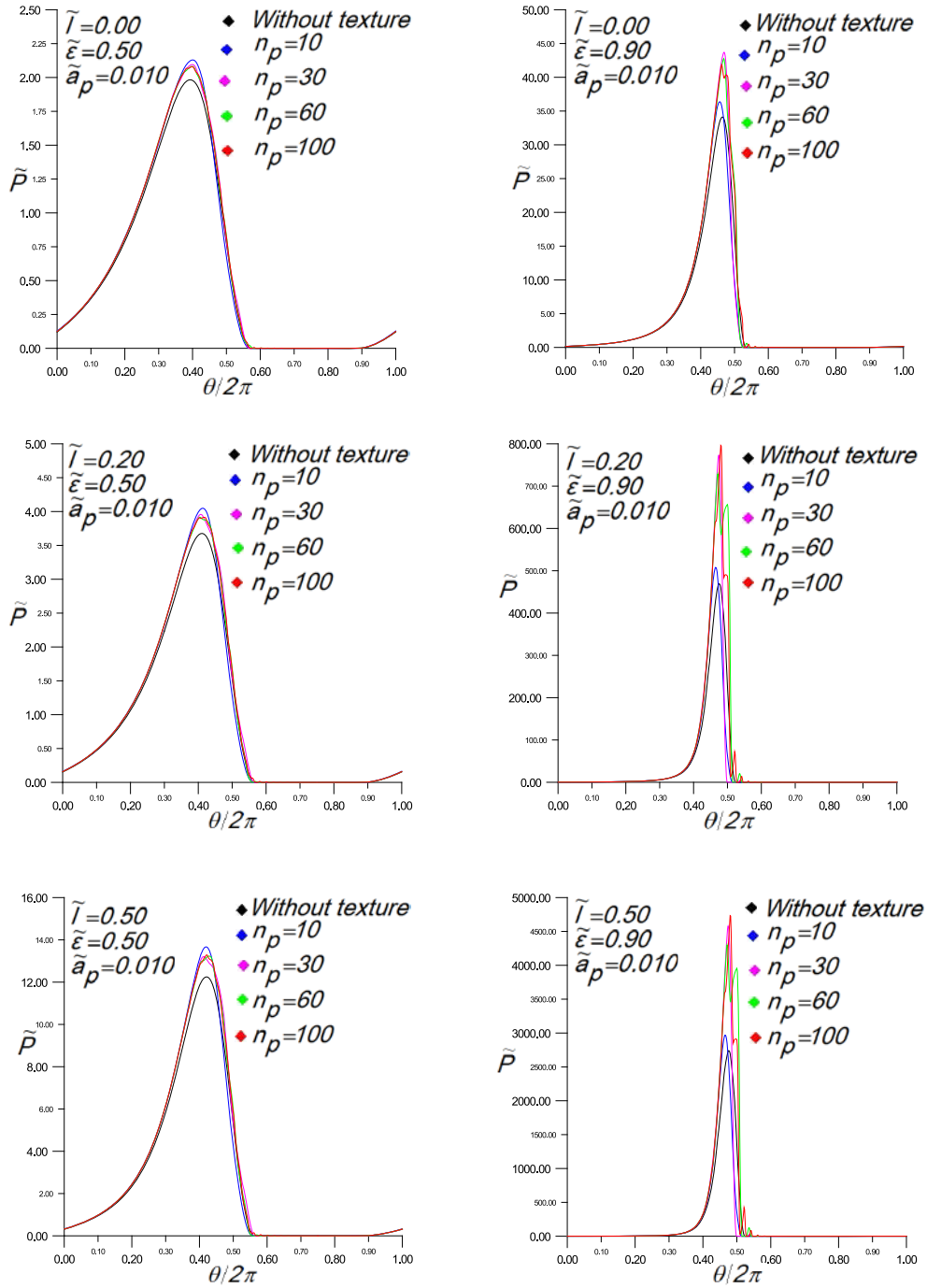


Figure 4. Circumferential static pressure in journal bearing for different value of n_p and $\tilde{l}$.

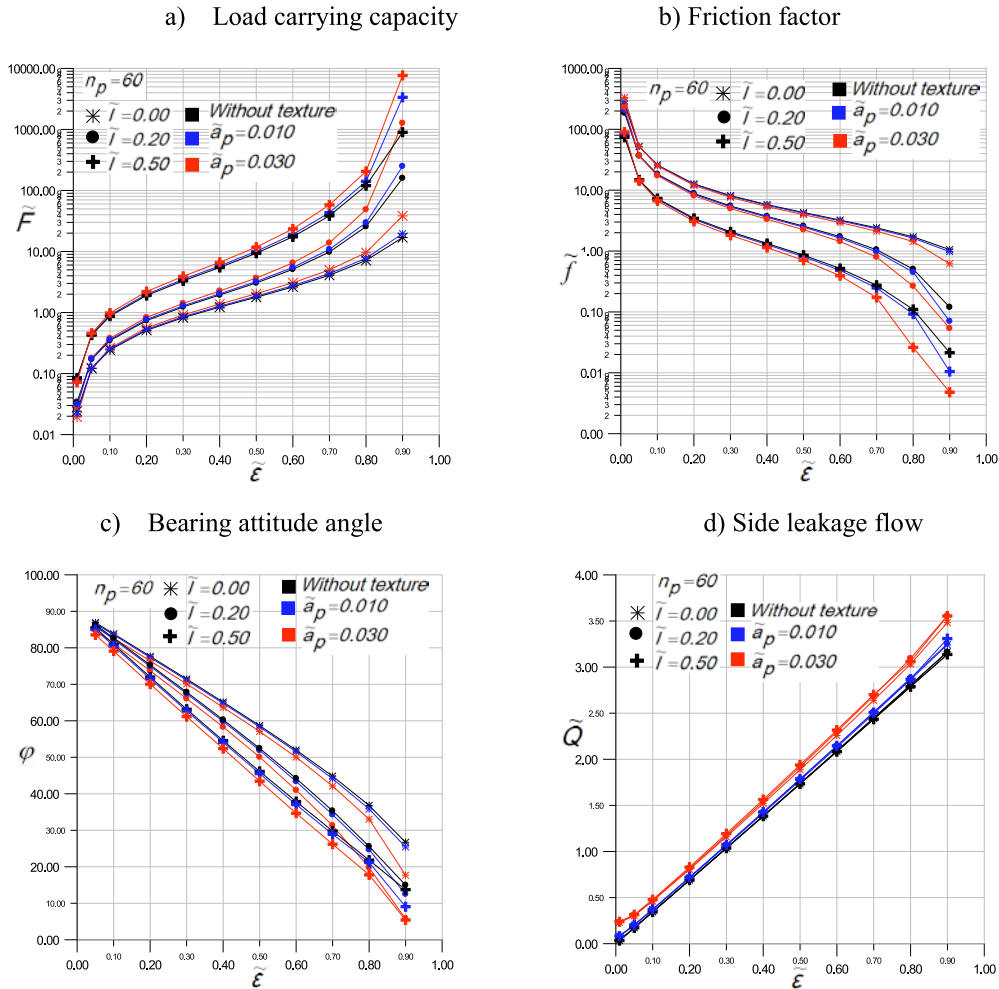


Figure 5. Dimensionless static characteristics for various values of $\bar{a}_p$ and $\bar{l}$.

Acknowledgement

The authors thank Professor Michel Fillon for his valuable comments.

Reference

Reference [11] corresponds in fact to reference [3] (Vencl et al.), which resulted in a shift in the numbering of references up to [11].

Corrected references

- [1] O. Reynolds, "On the theory of lubrication and its application to Mr. Beauchamp Tower's experiments, including an experimental determination of the viscosity of olive oil", *Philos. Trans. R. Soc. Lond.* **177** (1886), pp. 157–234.
- [2] K. Serpin, *Anti-friction texturing of the cylindrical bearings of crankshafts*, Paris Tech online theses, Process Engineering, ENSAM, 2017. Online at <https://pastel.hal.science/tel-01692997v1> (accessed on December 1, 2023).

- [3] I. Etsion, "State of the art in laser surface texturing", *J. Tribol.* **127** (2005), no. 1, pp. 248–253.
- [4] D. B. Hamilton, J. A. Walowit and C. M. Allen, "A theory of lubrication by micro-irregularities", *J. Basic Eng.* **88** (1966), no. 1, pp. 177–185.
- [5] V. Brizmer, Y. Kligerman and I. Etsion, "A laser surface textured parallel thrust bearing", *Tribol. Trans.* **46** (2003), no. 3, pp. 397–403.
- [6] M. Powell, A. V. Olver, A. D. Gosman, H. A. Spikes and I. Pegg, "Entrainment and inlet suction: two mechanisms of hydrodynamic lubrication in textured bearings", *J. Tribol.* **129** (2006), no. 2, pp. 336–347.
- [7] M. D. Pascovici, T. Cicone, M. Fillon and M. B. Dobrica, "Analytical investigation of a partially textured parallel slider", *Proc. Inst. Mech. Eng., Part J: J. Eng. Tribol.* **223** (2008), no. 2, pp. 151–158.
- [8] M. Arghir, N. Roucou, M. Helene and J. Frene, "Theoretical analysis of the incompressible laminar flow in a Macro-Roughness cell", *J. Tribol.* **125** (2003), no. 2, pp. 309–318.
- [9] M. B. Dobrica and M. Fillon, "About the validity of Reynolds equation and inertia effects in textured sliders of infinite width", *Proc. Inst. Mech. Eng. J: J. Eng. Tribol.* **223** (2008), no. 1, pp. 69–78.
- [10] D. Gropper, L. Wang and T. J. Harvey, "Hydrodynamic lubrication of textured surfaces: a review of modeling techniques and key findings", *Tribol. Int.* **94** (2015), pp. 509–529.
- [11] A. Vencel, L. Ivanović, B. S. Stojanović, E. Zadorozhnaya, S. Miladinović and P. Svoboda, "Surface texturing for tribological applications: a review", in *16th International Conference on Tribology*, Faculty of Engineering University of Kragujevac, Serbian Tribology Society, 2019, pp. 227–239.