

EXPERIMENTAL STAND FOR MEASURING NONSTATIONARY FILM LUBRICATION BY INTERFEROMETRY – PART I: THE MECHANICAL PART

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By following an original design, an experimental stand for assessing lubricated contacts under transitory conditions was executed in the Contact Mechanics Laboratory of the Suceava University. This paper presents only the mechanical part, while the other two are addressed in an companion paper.

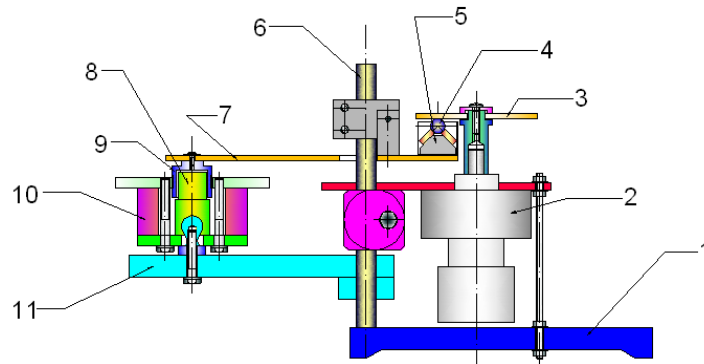


Fig. 1. Stand scheme

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| 1. stand support; | 7. loading plate; |
| 2. motor (DC), | 8. core; |
| 3. semireflective glass disc; | 9. coil; |
| 4. steel ball; | 10. permanent magnet; |
| 5. support for three rolling bearings; | 11. coil support. |
| 6. support rod; | |

This stand uses white light interferometry to assess the lubricant film thickness, based on a one-to-one relation between film thickness and colored fringes obtained. A special glass disk coated by a chrome layer and an antireflective MgF₂ optical material was designed by the authors.

The command block generates such a signal as to achieve a constant speed and/or loading level or to vary them both following sinusoidal or triangular laws, in the range of 33.32 - 100 rpm and 5.4 – 18 N respectively.

REFERENCES

- [1] Marklund, O., Gustafsson, L., (1999), *Correction for Pressure Dependence of the Refractive Index in the Measurements of Lubricant Film Thickness with Image Analysis*. Proc Inst Mech Engrs - Part I: J Eng Tribol **213**, pp. 109–126.
- [2] Marklund, O., Gustafsson, L., (2001), *Interferometry-Based Measurements of Oil-Film Thickness*. Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology, vol. 215, no. 3, pp. 243–259,.