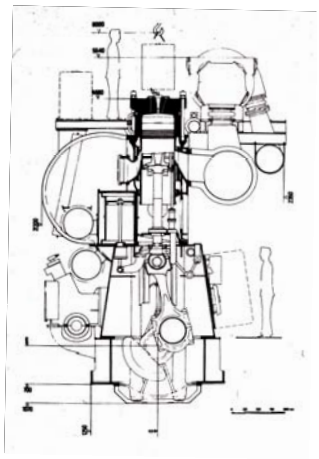
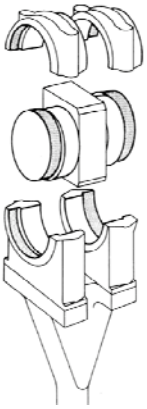
MECHANICS COLLOQUIUM



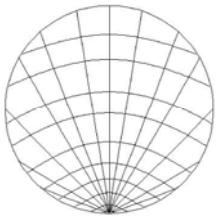
Wednesday, April 8, 2009
12:45-13:30 h.
Delft University of Technology
Faculty of Mechanical Engineering
Room B.



crosshead bearing

GMT 1060 engine
(bore = 1060 mm)

"Numerical Analysis of Dynamically-Loaded Journal Bearings"



John F. Booker
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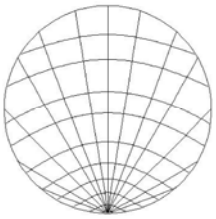

Part 1: *Special application: offset journal bearings.*
'Offset' journal bearings have a long and successful history in applications lacking both load reversal and adequate journal/sleeve relative angular velocity. By enhancing transient 'squeeze film' effects, offset bearings can often replace unsatisfactory thin-film mixed or boundary lubrication with excellent thick-film hydrodynamic lubrication conditions.
Offset designs have been employed for some time in cross-head and wrist-pin journal bearings for two-stroke engines, which do not experience load reversal at lower speeds. Other possible applications might include pendulum pivot and universal joint bearings.
Computational evidence also suggests that offset bearings might provide a good design alternative to multi-lobed rotor bearings in alleviating whirl instability, since offset bearings can support half-speed rotating loads (as well as steady loads with counter-rotating journal and sleeve).
Part 2: *Efficient dynamic analysis: mobility/impedance method.*
The mobility and impedance methods were developed independently in the United States at Cornell University and in the Netherlands at Technical University Delft and (later) Technical University Twente.
Though somewhat subtle conceptually, both methods are straightforward and efficient.
Despite their limitations these stored-characteristic methods allow computation several orders of magnitude faster that corresponding finite element or finite difference methods.

About the speaker – John F. Booker is Professor Emeritus and Graduate School Professor at the Sibley School of Mechanical and Aerospace Engineering of Cornell University. He is a fellow of both the American Society of Mechanical Engineers and the Institution of Mechanical Engineers. Professor Booker specializes in fluid film lubrication, finite element methods, and computer-aided simulation and design of mechanical systems. He and his students have developed numerical methods and software that are widely used for the design analysis of journal bearings. Current research generally concerns effects of structural compliance, geometrical irregularity, and lubricant cavitation on dynamic performance of fluid-film bearing systems in both industrial and biomechanical applications. He has been a Visiting Fellow at TUTwente and a Fulbright Fellow at TU Eindhoven. He first visited TUDelft in 1967.
http://www.mae.cornell.edu/index.cfm/page/fac/Booker.htm