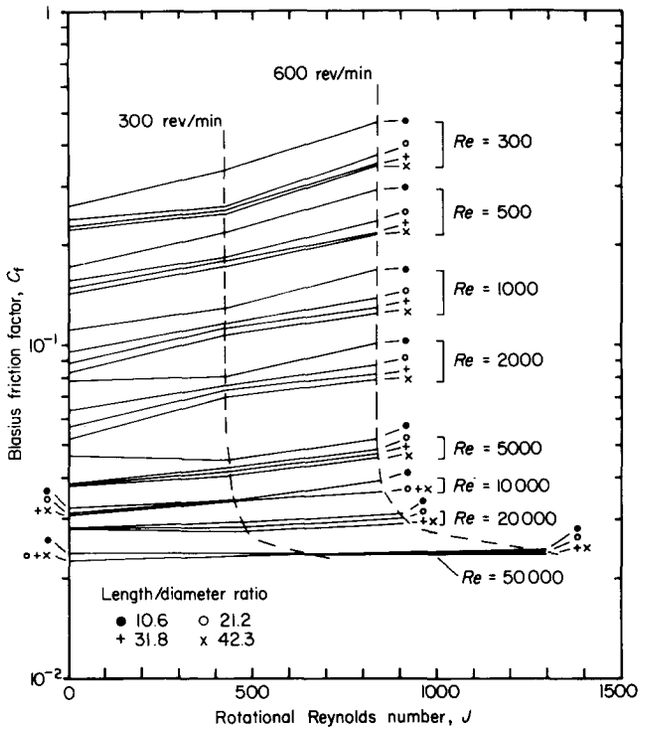


*Fig 8 Influence of rotational Reynolds number, and length/diameter ratios, on friction factors for various Reynolds numbers with inlet configuration D*

from laminar to turbulent flow in the Reynolds number range $2000 < Re < 15\,000$. In this range of Reynolds numbers a severe 'dip' in friction factor can occur with stationary tubes, so friction factors with rotation can be increased significantly in relative terms.

These comments are mainly applicable to situations where the deliberate attempt has been made to smooth upstream flow irregularities at the entry plane of the tube concerned. If this is not done (see data for inlet configuration A), then particularly large tube lengths in terms of equivalent diameters will be necessary before developed flow is produced; thus there will be severe increases in flow resistance for practical tube aspect ratios.

With relatively short aspect ratio tubes, the combined effect of entry plane velocity condition and Coriolis forces, as the manifestation of rotation, can cause noticeable increases in friction factor with this effect becoming progressively suppressed as the tube aspect ratio increases, ie as greater proportions of the tube length are dominated by fully developed flow.

No attempt is made at this stage to produce correlation-type equations because the work is currently being extended to cover a more extensive range of variables. This report is, consequently, intended to inject a note of caution when the flow and associated heat transfer characteristics of rotating cooling systems are being considered.

## Acknowledgements

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## References

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3. **Morris W. D. and Woods J. L.** An investigation of Laminar Flow in the Rotor Windings of Directly-Cooled Electrical Machines. *J. Mech Eng. Sci. (1974)* **16**, *408*
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# CALENDAR

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| **International Symposium on Two-Phase Annular and Dispersed Flows** | 24–29 June 1984<br>Pisa, Italy | Paolo Andreussi, Dipartimento di Ingegneria Chimica, Universita di Pisa, Via Diotislavi 2, 56100 Pisa, Italy |
| **2nd International Symposium on Applications of Laser Anemometry to Fluid Mechanics** | 2–4 July 1984<br>Lisbon, Portugal | Professor D. G. F. Durao, Department of Mechanical Engineering, Instituto Superior Tecnico, Avenida Rovisco Pais, 1096 Lisbon, Portugal |
| **1st UK National Heat Transfer Conference** | 3–5 July 1984<br>Leeds, UK | Dr P. J. Heggs, Chemical Engineering Department, Leeds University, Leeds LS2 9JT, UK |
| **NATO Advanced Study Institute: Natural Convection—Fundamentals and Applications** | 16–27 July 1984<br>Izmir, Turkey | Dr S. Kakac, Department of Mechanical Engineering, University of Miami, Coral Gables, FL 33124, USA |

## Calendar

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| **Gordon Research Conferences: Modeling of Flow in Permeable Media** | 30 July–3 August 1984<br>Proctor, NH, USA | Dr A. M. Cruickshank, Director, Gordon Research Conferences, Colby–Sawyer College, New London, NH 03257, USA |
| **22nd ASME/AIChE National Heat Transfer Conference** | 5–8 August 1984<br>Niagara Falls, NY, USA | ASME, 345 East 47th Street, New York, NY 10017, USA |
| **19th Intersociety Energy Conversion Engineering Conference** | 19–24 August 1984<br>San Francisco, CA, USA | Dr G. Graves, M/S 102, Los Alamos Science Laboratory, PO Box 1663, Los Alamos, NM 87545, USA |
| **12th Symposium of the International Association for Hydraulic Research—IAHR (Hydraulic machinery in the energy related industries)** | 27–30 August 1984<br>Stirling, UK | Conference Section, National Engineering Laboratory, East Kilbride, Glasgow G75 0QU, UK |
| **10th International Conference on the Properties of Steam** | 2–7 September 1984<br>Moscow, USSR | H. J. White, Office of Standard Reference Data, National Bureau of Standards, Washington DC20234, USA |
| **CHISA '84: International Congress of Chemical Engineering** | 3–7 September 1984<br>Prague, Czechoslovakia | Congress Secretariat, Attention: Dr J. Skarka, 8th Congress CHISA '84, PO Box 857, CS 111 21, Praha 1, Czechoslovakia |
| **Heat and Mass Transfer in Fixed and Fluidized Beds** | 3–7 September 1984<br>Dubrovnik, Yugoslavia | International Centre for Heat and Mass Transfer (ICHMT), Secretariat, PO Box 522, 11001 Belgrade, Yugoslavia |
| **9th European Thermophysical Properties Conference** | 17–21 September<br>Manchester, UK | Dr Roy Taylor, Department of Metallurgy, University of Manchester, Grosvenor Street, Manchester M1 7HS, UK |
| **Thermodynamics and Fluid Mechanics of Turbomachinery** | 17–28 September 1984<br>Izmir (Cesme), Turkey | Dr E. Paykoc, Mechanical Engineering Department, Middle East Technical University (ODTU), Ankara, Turkey |
| **International Conference on Direct Fired Heat Pumps** | 19–21 September 1984<br>Bristol, UK | P. W. Fitt, Department of Mechanical Engineering, University of Bristol, Queen's Building, University Walk, Bristol BS8 ITR, UK |
| **Teaching Thermodynamics to Engineers** | 20–21 September<br>Cambridge, UK | Dr J. D. Lewins, University Engineering Department, Trumpington Street, Cambridge CB2 1PZ, UK |
| **2nd International Symposium on Large Scale Applications of Heat Pumps** | 25–27 September 1984<br>York, UK | BHRA Fluid Engineering Centre, Cranfield, Bedford MK43 0AJ, UK |
| **Flow Measurement in the Oil Industry** | 16–18 October 1984<br>Glasgow, UK | P. Collier, Conference Organiser, National Engineering Laboratory, East Kilbride, Glasgow G75 0QU, UK |
| **Centrifugal Machinery Symposium (part of ASME Winter Annual Meeting)** | 9–13 December 1984<br>New Orleans, LA, USA | ASME, 345 E 47th Street, New York, NY 10017, USA |
| **Small Hydro-Power Fluid Machinery Symposium (part of ASME Winter Annual Meeting)** | 9–13 December 1984<br>New Orleans, LA, USA | ASME, 345 E 47th Street, New York, NY 10017, USA |
| **International Symposium on Cavitation Inception (part of ASME Winter Annual Meeting)** | 9–13 December 1984<br>New Orleans, LA, USA | Dr Blaine R. Parkin, Applied Research Laboratory, PO Box 30, State College, PA 16801, USA |
| **Symposium on Multidimensional Fluid Transients (part of ASME Winter Annual Meeting)** | 9–13 December, 1984<br>New Orleans, LA, USA | C. Samuel Martin, School of Civil Engineering, Georgia Institute of Technology, Atlanta, GA 30332, USA |
| **Unsteady Flow, Surge and Stall in Turbomachinery (part of ASME Winter Annual Meeting)** | 9–13 December1984<br>New Orleans, LA, USA | Dr. D. Japikse, Concepts ETI Inc, PO Box 643, Norwich, Vermont 05044, USA |
| **Forum on Flows in Internal Combustion Engines (part of ASME Winter Annual Meeting)** | 9–13 December 1984<br>New Orleans, LA, USA | Dr T. Uzkan, Electro-Motive Division of General Motors, Department 870, 9301 W 55th Street, LaGrange, IL 60525, USA |
| **Forum on Unsteady Flows (part of ASME Winter Annual Meeting)** | 9–13 December, 1984<br>New Orleans, LA, USA | Dr P. H. Rothe, Chairman, Forum on Unsteady Flows, Creare Incorporated, PO Box 71, Hanover, NH 03755, USA |
| **Mass Flow Measurements (part of ASME Winter Annual Meeting)** | 9–13 December 1984<br>New Orleans, LA, USA | Dr T. R. Heidrick, Alberta Research Council, 11315-87th Avenue, Edmonton, Alberta 16G 2C2, Canada |
| **Symposium of Flow-induced Vibration (part of ASME Winter Annual Meeting)** | 9–13 December 1984<br>New Orleans, LA, USA | Michael P. Paidoussis, Department of Mechanical Engineering, McGill University, 817 Sherbrooke Street West, Montreal, Quebec H3A 2K6, Canada |