RUHR-UNIVERSITÄT BOCHUM

FIFTH COLLOQUIUM

CAVITATION AND CAVITATION EROSION

05./06. NOVEMBER 2024

PROGRAM

As at: 23.08.2024

Prof. Dr.-Ing. Romuald Skoda,
Hydraulische Strömungs-
maschinen (HSM),
Ruhr-Universität Bochum

Prof. Dr.-Ing. Michael Pohl
Werkstoffprüfung (WP)
Ruhr-Universität Bochum

Prof. Dr.-Ing. Bettar Ould el Moctar
Schiffstechnik, Meerestechnik,
Transportsysteme (ISMT),
Universität Duisburg-Essen

ACCOMMODATION

Room contingents have been reserved for the night of 05.11. to 06.11.2024, as well as for two nights from 04.11.2024. You can register at the following hotels up to and including 24.09.2024 under the keyword „Kavitation“:

Moxy Bochum
ASHG Bochum OpCo GmbH
Stadionring 18
44791 Bochum
Tel.: +49 234 6101 115
Events.bochum@ashg.eu
Price category: Single room from 79,00 EUR

H+ Hotel Bochum
Curator Hotelbetriebsges. Ruhrgebiet GmbH
Stadionring 22
44791 Bochum
Tel.: +49 234 92566 511
ReservierungBO@h-hotels.com
Price category: Single room from 89,00 EUR

Both hotels are within walking distance of public transportation to the Veranstaltungszentrum Ruhr-Universität Bochum.

REGISTRATION

Please register via email with the subject *Kavitation2024* to the HSM secretariat (hydro@rub.de).

DATES

01.08.2024 Registration deadline for presentations
15.08.2024 Publication program
01.10.2024 Registration deadline for participation
05.11.2024 Colloquium day 1, approx. 08:40-21:00
06.11.2024 Colloquium day 2, approx. 08:40-14:00

PARTICIPATION FEE

We charge a participation fee of 250 € as a contribution to the costs:

- Colloquium incl. welcome coffee & refreshments during breaks
- Lunch buffet and dinner on 05.11.2024
- Lunch on 06.11.2024
- Printed proceedings

The prices include taxes. We ask you to transfer the fees by **15.10.2024**, the bank details will be communicated after binding registration.
Cash payment on the day of the event is not possible.
A reduced fee is available for students on request.

CONFERENCE VENUE

Ruhr-Universität Bochum
Veranstaltungszentrum Saal 1
Universitätsstraße 150
44801 Bochum

KOORDINATION 2024
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COLLOQUIUM ON CAVITATION AND CAVITATION EROSION

OCCASION

Cavitation has been the subject of research in various scientific disciplines for many decades, e.g., in physics, chemistry, mathematics, medicine and engineering.

The Ruhr University Bochum and the University of Duisburg-Essen are therefore jointly organizing a colloquium on cavitation and cavitation erosion for the fifth time.

The aim of the colloquium is to exchange knowledge and promote communication between representatives from academia and industry. The colloquium is designed as a networking workshop event, so contributions from different disciplines are welcome.

TOPICS AND DISCIPLINES

- Physics, medicine, chemistry, mathematics, engineering
- Fluid mechanics and materials science
- Fundamentals and application
- Theory, experiment and simulation
- Hydrodynamic and acoustic cavitation
- Turbo and displacement machinery, fluid and injection technology
- Cleaning technology
- Medical applications
- Bubble dynamics

PROGRAM

TUESDAY, 05. NOVEMBER 2024

08:15 Reception and welcome coffee

08:40 Greeting by **Michael Pohl and Romuald Skoda**

09:00 **V. Agrež[1,2], Z. Heidary[1], M. Gravaises[3,4], R. Petkovšek[2], C.D. Ohl[1]**: Bubble detachment from a vibrating electrode, [1]: Inst. Phys., Department Soft Matter, OvGU Magdeburg, [2]: Univ. Ljubljana, [3]: IVT, OvGU Magdeburg, [4]: SST, Univ. London

09:20 **M. Dawoodian, O. el Moctar**: Effects of gas pockets on nucleation and growing of nanobubbles, ISMT, UDE

09:40 **V. Agrež[1,2], R. Petkovšek[2], C.D. Ohl[1]**: Investigation of streamers formation during cavitation bubble collapse, [1]: Inst. Phys., Department Soft Matter, OvGU Magdeburg, [2]: Univ. Ljubljana

10:00 **J. Mur[1,2], R. Petkovsek[2], C.D. Ohl[1,3]**: Sonoluminescence of erosive cavitation bubbles at solid boundaries, [1]: Inst. Phys., Department Soft Matter, OvGU Magdeburg, [2]: Univ. Ljubljana, [3]: STIMULATE, Univ. Magdeburg

10:20 Break

10:50 **S. Razaee, E. Kadivar, O. el Moctar**: Molecular dynamics simulations of a nanobubble's collapse-induced erosion on nickel boundary and porous nickel foam boundary, ISMT, UDE

11:10 **S.I. Ghasemian[1,2], Y. Fan[1,2], F. Reuter[1], C.D. Ohl[1,2]**: Cavitation Induced Shear Wave Rheometry, [1]: Inst. Phys., Department Soft Matter, OvGU Magdeburg, [2]: STIMULATE, Univ. Magdeburg

11:30 **U. Lantermann, O. el Moctar**: Numerical Study of Single Cavitation Bubble Collapse near a Wall using a Mass Transfer Model, ISMT, UDE

11:50 **C. Lechner[1], M. Koch[2], M. Tervo[2], R. Mettin[2]**: Dynamics of acoustically excited bubbles close to a solid wall, [1]: Inst. Fluid Mech. Heat Transfer, TU Wien, [2]: 3. Phys. Inst., GAU Göttingen

12:10 Lunch

13:30 **Y. Sun[1], Y. Fan[2], Z. Yao[1], C.D. Ohl[2]**: The collapse and jet formation of cavitation bubble under confined free surface, [1]: CWRCE, China Agricultural University, [2]: Inst. Phys., Department Soft Matter, OvGU Magdeburg

13:50 **M. Koch[1], J.M. Rossello[2], H.P. Hoeppe[3], C. Lechner[4], R. Mettin[1]**: Oblique jetting by bubbles close to the edge of a solid surface, [1]: 3. Phys. Inst., GAU Göttingen, [2]: Univ. Ljubljana, [3]: IRP, GAU Göttingen, [4]: Inst. Fluid Mech. Heat Transfer, TU Wien

14:10 **M. Tervo[1], M. Koch[1], C. Lechner[2], R. Mettin[1]**: Microstreaming induced by acoustically driven oscillating bubbles at a solid boundary, [1]: 3. Phys. Inst., GAU Göttingen, [2]: Inst. Fluid Mech. Heat Transfer, TU Wien

14:30 Break

15:00 **Y. Sharma, Y. Fan, C.D. Ohl**: Nanobubble characterization using high-speed Ultrasound Imaging, Inst. Phys., Department Soft Matter, OvGU Magdeburg

15:20 **M. Abedini[1], S. Hanke[1], F. Reuter[2]**: In situ measurement of cavitation damage using a high-speed electrochemical technique, [1]: Inst. Techn. der Metalle, UDE [2]: Inst. Phys., Department Soft Matter, OvGU Magdeburg

15:40 **Ž. Boček[1], M. Petkovšek[2], S.J. Clark[2], K. Fezzaa[2], M. Dular[1]**: Kelvin-Helmholtz instability governs emulsification by hydrodynamic cavitation, [1]: Univ. Ljubljana, [2]: APS, Argonne National Laboratory

16:00 Coffee break

16:30 **P. Pfeiffer, C.D. Ohl**: On-demand cavitation inception in a Venturi channel, Inst. Phys., Department Soft Matter, OvGU Magdeburg

16:50 **T. Krimm, G. Hatzissawidis, M.M.G. Kuhr, G.J. Ludwig, P.F. Pelz**: Flow visualisation and surface pressure measurements on a modified CLE-hydrofoil, FST, TU-Darmstadt

17:10 **M. Haese, R. Skoda**: Compressible CFD method for the calculation of viscous effects in cloud cavitation, HSM, RUB

18:30 Dinner at Restaurant *Franz Ferdinand*, Bochum

WEDNESDAY, 06. NOVEMBER 2024

08:15 Welcome coffee

08:40 **R. Mettin[1], A. Aghelmaleki[1], M. Tervo[1], M. Koch[1], C. Lechner[2], G. Brenner[3]**: Influence of viscosity on cavitation structures and erosion, [1]: 3. Phys. Inst., GAU Göttingen, [2]: Inst. Fluid Mech. Heat Transfer, TU Wien, [3]: Inst. App. Mech., TU Clausthal

09:00 **A. Peters, O. el Moctar**: Numerical Investigation of the Effects of Phase Change on Sloshing-Induced Impact Pressures, ISMT, UDE

09:20 **J. Groschopp, F. Rüdiger**: Studie zur Charakterisierung kavitierender Prallstrahlen, ISM, TU-Dresden

09:40 **P.T.L. dos Santos[1], J. Kurzynski[2], M. Abedini[1], M. Laubrock[2], S. Hanke[1]**: Influence of reversed austenite on the cavitation-erosion and corrosion resistance of a super martensitic stainless steel, [1]: Inst. Techn. der Metalle, UDE [2]: Mat. Eng. Lab., FH Münster

10:00 Break

10:30 **J. Stella[1], M. Pohl[2], A. Treff[2], B. Reetz[2]**: Kavitationserosion von einem bleifreien Messing (CuZn10Si5Al1): Eine EBSD-Untersuchung zu einer Kupfer-basis Legierung mit hexagonaler Kristallstruktur, [1]: Dpto. Ciencia de los Materiales, USB, [2]: WP, RUB, [3]: Otto Fuchs Dülken GmbH & Co. KG

10:50 **U. Bauerschäfer[1], L. Ledig[1], S. Gai[1], H. Antonowitz[2], M. Lonka Nedreberg[3], J.E. Rise[3], D. Cook[4]**: Test of Coatings of Carbon Fiber Reinforced Polymers with Cavitation Erosion based on ASTM G32-16, [1]: GMBU e.V. Halle, [2]: Leichtbau-Zentrum Sachsen, [3]: Kongsberg Maritime, [4]: Airborne UK

11:10 **V. Cara, M. Abedini, S. Hanke**: Effect of grain size on the cavitation erosion rate and mechanisms of 316L stainless steel after different heat treatments, Inst. Techn. der Metalle, UDE

11:30 Break

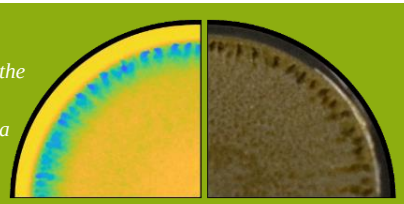
12:00 **F. Krafft[1], J. Stella[2], M. Pohl[1]**: Kavitationserosion von Cronidur 30: Eine Untersuchung der spannungsinduzierten martensitischen Umwandlung bei Kavitationsbeanspruchung, [1]: WP, RUB, [2]: Dpto. Ciencia de los Materiales, USB

12:20 **J. Kühlmann[1], M. Abedini[2], V. Ersoy[1], S. Hanke[2], S.A. Kaiser[1]**: Visualization of bubble cloud dynamics in acoustic cavitation with a counter-sample, [1]: EMPI - Reactive Fluids, UDE, [2]: Inst. Techn. der Metalle, UDE

12:40 **T. Gianfelice, R. Skoda:** 3D flow simulation to investigate the influence of temperature on the flow aggressiveness in the gap of an ultrasonic cavitation device, HSM, RUB

13:00 Farewell by **Bettar Ould el Moctar**

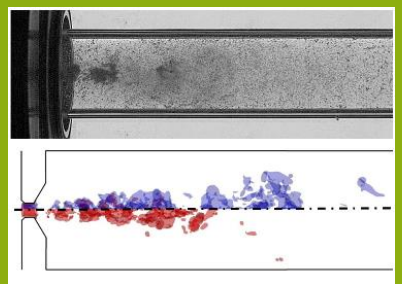
13:15 Lunch



Erosion topography on the head and cavitation structures in the gap of a sonotrode.

Tip and hub vortex cavitation on a ship's propeller.

Air degassing at a cavitating nozzle flow: Air (blue) and vapor structures (red).



Single bubble collapse near the wall: Experiment (left) and simulation (right).