

The University of Cyprus dedicates an amphitheater to the late rheology pioneer and visionary Dean, Prof. Andreas Alexandrou.

It is with profound emotion, deep respect, and immense pride that the Hellenic Society of Rheology (HSR) attended the Naming Ceremony of Amphitheater B101 at the University of Cyprus (UCY) Faculty of Engineering, now forever dedicated to the memory of the late Professor Andreas N. Alexandrou (1957–2018).

Andreas was a pioneering researcher in computational rheology and non-Newtonian fluid mechanics, the very first Professor, and the first elected Dean of the UCY School of Engineering. For Andreas, the rigorous, multidisciplinary science of rheology was not just a research interest; it was a catalyst for establishing world-class academic standards at the newly formed faculty. By anchoring the institution's early research output and curriculum in this highly demanding scientific field, his visionary leadership became instrumental in the rapid development of the University of Cyprus. He effectively utilized the scientific excellence inherent in rheological research to lay a robust institutional foundation, helping to shape UCY into a modern beacon of educational prestige and innovation within the European academic landscape.

Beyond the university walls, Andreas was a founding pillar, a tireless advocate, and a past President of our Society. From the historic 1996 symposium that sparked the creation of HSR, he played a pivotal role in uniting researchers across borders. He helped forge a dynamic, globally recognized Greek-Cypriot rheological community—one that continues to drive scientific excellence, technological innovation, and academic collaboration across Cyprus, Greece, and the international diaspora. His monumental textbooks and collaborative spirit left a permanent mark on our field.

The emotional event was beautifully coordinated by Prof. Loucas Louca (Chair of the Dept. of Mechanical and Manufacturing Engineering) and brought together a wide community of colleagues, students, and loved ones whose lives Andreas so deeply touched. Alongside Prof. Yannis Dimakopoulos (Department of Chemical Engineering, University of Patras, Greece) and Prof. Georgiou Georgiou (Department of Mathematics and Statistics, University of Cyprus, Cyprus), the audience was moved by a series of heartfelt speeches and interventions from:

- Prof. Marina Neophytou, Dean of the Faculty of Engineering
- Andreas Philippou, Emeritus Prof. at the Univ. of Patras & former Minister of Education of Cyprus
- Prof. Nikolaos A. Gatsonis (Worcester Polytechnic Institute)

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- His former students, Andreas Grigoriou and Georgios Katsampas, representing his pedagogical legacy
- His beloved wife, the acclaimed poet Lisa Suhair Majaj, whose presence was a poignant reminder of his profound devotion to his family.

HSR was proudly represented at the ceremony by the current President of the Society, Prof. Y. Dimakopoulos, and Prof. G. Georgiou, who both delivered deeply moving, highly personal tributes that captured the true essence of the honoree.

Reflecting on his remarkable character, Prof. Georgiou beautifully remembered Andreas as a "complete intellectual" and a true "Homo Universalis." Despite the immense burden of cutting-edge research and university administration, his passions extended far beyond engineering—embracing photography, archaeology, politics, and literature. Prof. Georgiou highlighted Andreas's exceptional leadership as the first Dean, noting that his tenure was defined by unwavering integrity, profound composure, and a unique ability to bridge differing views with courtesy, calmness, and mutual respect.

Representing the broader rheological community, Prof. Dimakopoulos drew a highly poignant parallel to Andreas's own scientific research. While Andreas spent his life studying "yield-stress fluids"—materials that behave like solid, rigid bodies until a critical pressure forces them to collapse and flow—Andreas himself refused to yield. During his courageous, 11-year epic battle with illness, he never "collapsed." Instead, he faced physical decline with noble dignity and a constant smile, entering amphitheatres to teach despite the pain, and remaining a steadfast rock for his family, his doctoral candidates, and our academic community.

By naming this amphitheater after him, the University of Cyprus places Andreas exactly where he always belonged: among the eager, progressive youth he loved to teach. Every student who crosses those doors will now be guided by the spirit of a truly great engineer and an uncompromising, free academic soul.

#Rheology #HSR #UniversityOfCyprus #Engineering #FluidMechanics #HigherEducation
#EuropeanEducation #ScientificExcellence #InMemoriam #AcademicLegacy #ViscoplasticFluids
#Mentorship

The academic work of Professor Andreas N. Alexandrou

Georgios Georgiou

Dear Lisa,

Dear colleagues,

Dear students,

It is a great honor and pleasure for me to be here today at the naming ceremony of the Andreas N. Alexandrou Amphitheatre, to speak about the academic work of the honoree, who was a close colleague, mentor, and friend of mine. The Department of Mechanical and Manufacturing Engineering recognizes and honors the contribution of a person who left an indelible mark on the University of Cyprus, on science, and on the hearts of his colleagues and students. The naming of this amphitheatre serves as a lasting reminder of the ethos, dedication, and academic legacy of Andreas Alexandrou.

Andreas studied Mechanical Engineering at the American University of Beirut, where he also met his future wife, Lisa Majaj. In 1982, Lisa and Andreas moved to Ann Arbor to pursue graduate studies in English Literature and Mechanical Engineering respectively at the University of Michigan. After completing his PhD in Mechanical Engineering in 1986, Andreas worked for one year as a postdoctoral researcher with Professor Tasos Papanastasiou in the Department of Chemical Engineering. I note that another amphitheatre of the School of Engineering, in the Department of Civil and Environmental Engineering, will soon be named in honor of Tasos Papanastasiou.

In 1987, Andreas Alexandrou was appointed Assistant Professor in the Department of Mechanical Engineering at Worcester Polytechnic Institute (WPI). In 1992, he was promoted to Associate Professor, and in 1998 to Professor. Andreas distinguished himself not only in research but also in teaching, receiving several teaching awards. In 1992, he became the youngest faculty member to receive WPI's Outstanding Teaching Award. In 2001, Andreas returned to Cyprus as the first professor of the newly established School of Engineering at the University of Cyprus. He initially served as Interim Chair of the Department of Mechanical and Manufacturing Engineering and subsequently as Interim Dean of the School of Engineering. From 2004 to 2007, he served as the first elected Dean of the School of Engineering.

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The research work of Andreas Alexandrou focused mainly on the fields of Rheology and Non-Newtonian Fluid Mechanics. Several of his papers concerned so-called viscoplastic fluids, that is, fluids that flow only above a critical stress, the yield stress, with emphasis on applications in semi-solid metal processing. Andreas's work also included numerical simulations of extrusion instabilities and shaping of polymer melts and other complex materials, as well as the modeling of solidification problems through inverse finite element methods. His contribution to the accurate determination of the so-called yield surfaces — the interfaces between yielded and unyielded regions in viscoplastic flows — was particularly important. Together with his doctoral student Gilmer Burgos, he demonstrated that regularized models, such as the one proposed by Papanastasiou, with appropriate selection of regularization parameters, can be used both to predict the main flow and to properly describe the unyielded regions, where the material moves without deformation, that is, as a solid rather than as a fluid.

At WPI, Andreas had a long-standing collaboration with Professor Diran Apelian, founder and first Director of the Center for Metals Processing. Andreas succeeded Apelian as the second Director of the Center (1998–2001). Apelian and Alexandrou combined experiments with numerical methods for the accurate rheological characterization of semi-solid materials and for more realistic numerical simulations of the forming processes of these materials. Specifically, they developed a well-controlled experimental setup for accurate measurements in compression flow, as well as new numerical techniques incorporating an “inverse modeling” strategy for simulating the corresponding experiments. The advantage of this technique is that the compression flow problem is solved in Lagrangian coordinates, and thus the unknown position of the free surface is automatically calculated together with the remaining unknown flow fields, namely velocity and pressure.

Andreas introduced new ideas into the semi-solid metals community, emphasizing the need for scientific and reliable procedures and analyses in the modeling of forming processes. In close collaboration with the Russian academic Professor Vladimir Entov, he studied the steady propagation of bubbles in viscoplastic and other generalized Newtonian fluids, revealing important phenomena not observed in the Newtonian case.

Andreas Alexandrou was the first to point out the need for the use of thixotropic models for the accurate simulation of semi-solid material flows. These materials are injected at high speed into standardized cavities, with the process lasting only fractions of a second, and therefore the initial, very short-term response of the material is extremely important for understanding the rheology and for the further

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development of the process. In collaboration with Entov and Burgos, Andreas proposed a structural thixotropic model in which the rheological parameters are functions of a structural parameter following first-order kinetics. In subsequent works, Andreas developed a new computational method for applying this thixotropic model to rheometric and other flows.

Andreas also promoted the idea of combining computational rheology and rheometry for the characterization of semi-solid materials and advocated for the correct interpretation of rheometric data. He highlighted the importance of using “true values” for the deformation rate, since the material properties may differ significantly from those obtained using “apparent” deformation rate values.

In recent years, Andreas also studied turbulent viscoplastic flows around a cylinder in collaboration with Professor Stavros Kassinos and was involved in the development of Finite Control Volume Methods for the simulation of steady and time-dependent viscoplastic flows in collaboration with the current colleague Alexandros Syrakos, who succeeded him in the Department of Mechanical and Manufacturing Engineering. Andreas published more than 100 scientific papers, co-authored the book *Viscous Fluid Flow*, and wrote the book *Principles of Fluid Mechanics*. The first book was translated and published in Greek just last year, following the initiative of the next speaker, Professor Yiannis Dimakopoulos.

In addition to his administrative duties at the University of Cyprus, Andreas was especially active in serving the scientific community. He was among the founding members of the Hellenic Society of Rheology and served as its president from 2006 to 2008.

Andreas Alexandrou was an enthusiastic teacher and tireless mentor to his students and younger colleagues alike. He left behind a body of work that continues to inspire and guide. He was a model scientist, university teacher, and academic. His interests also extended far beyond the boundaries of his specialty. He was involved in photography, archaeology, politics, and literature. He was a free and restless spirit, a complete intellectual, and a true academic.

Beyond his remarkable scientific contributions and the important mark he left on our University, Andreas Alexandrou stood out for his integrity, composure, and quality of speech. With a calm character, deep cultivation, and a strong sense of responsibility, he always sought synthesis and mutual understanding, contributing substantially to the creation of a climate of cooperation and mutual respect within the collective bodies of the University in which he participated. Especially during his tenure as Dean, he demonstrated an exemplary style of leadership, based on dialogue, respect for differing opinions, sound

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argumentation, and the ability to bridge differing views with courtesy, calmness, and effectiveness. His presence inspired trust and moderation, leaving behind a precious legacy of academic culture and humanity. The decision to give his name to the new Amphitheatre is especially fitting and constitutes a meaningful tribute to his memory and contributions.

The name of Andreas Alexandrou will accompany the lectures, discussions, and ideas that will emerge in this space. Every student who will be taught or examined in this amphitheatre will become, even indirectly, a participant in the great academic legacy of Andreas Alexandrou.

Thank you.

The lasting imprint of a pioneering rheologist

Yannis Dimakopoulos
President of the Hellenic Society of Rheology

Dear Lisa,
Madam Dean, Honorable Mrs. Neophytou,
Mr. Chairman, Honorable Mr. Louca,
Mr. Former Minister of Education, Honorable Mr. Filipou,
distinguished members of the academic community of the University of Cyprus,
dear Panos,
ladies and gentlemen,
our dear students.

Our colleague and friend George Georgiou spoke to us a short while ago, in a deeply personal and moving manner, about the brilliant scientist Professor Andreas Alexandrou. He described to us the pioneering researcher, the award-winning teacher, the visionary, and the institutional founder—the first Dean of this very Faculty of Engineering.

I stand before you today in another, equally important capacity inextricably linked to the scientific journey of Professor Alexandrou. As President of the Hellenic Society of Rheology, I represent an entire scientific family in Cyprus, in Greece, and in the international diaspora. A family of which Professor Alexandrou was a founding member, a pillar, Vice-President, President, but above all, its very soul.

If the science of Engineering is about how we build the future, the science of Rheology is about how materials "flow", how they deform, and how they respond to stresses—or in more popular terms, to pressures. And believe me, Andreas, as an authentic Mechanical Engineer and brilliant Rheologist, knew about endurance. He knew how to convert pressure into work and deformation into creation.

To understand Andreas's footprint in our community, we must turn time back to 1986 at the University of Michigan. It was there that a young postdoctoral researcher in Mechanical Engineering, Andreas, met a charismatic Cypriot Assistant Professor of Chemical Engineering, the late Tasos Papanastasiou. This meeting was not merely the beginning of a collaboration; it was the birth of a historic scientific partnership that changed the map of computational rheology and the fluid mechanics of composite materials during that era.

Their scientific synergy was unique. When Professor Tasos Papanastasiou introduced his famous model, solving the until-then unsolved problem of modeling viscoplastic fluids, Andreas Alexandrou, with his astute and interdisciplinary perception, took this theory and put it into practice. Together, they developed

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innovative inverse finite element methods, providing answers to historical problems that had plagued the research community and the plastics and metals industries for years.

In particular, his work optimized the processing of semi-solid metals—a technique absolutely critical for the production of durable and lighter components in the aerospace and automotive industries. At the same time, his innovative simulations provided answers to exceptionally complex problems regarding stick-slip instabilities and the solidification of materials. His restless research spirit, however, led him all the way to space. By studying the formation of crystals in microgravity conditions, he successfully bridged the macroscopic behavior of fluids with microscopic physics. Through the comparison of terrestrial and space data, he deciphered exactly how the absence of gravity alters the growth of matter. In 1994, Tasos Papanastasiou passed away prematurely. For Andreas Alexandrou, the loss of his mentor and bosom friend was unbearable. But he did not allow their work to be silenced. On the contrary, he engaged in a moral and scientific crusade. In 1996, here in Nicosia, at the University of Cyprus, a historic symposium took place, dedicated entirely to the memory of Professor Tasos Papanastasiou. Andreas was present, bringing the global elite of rheology to his homeland, in an effort that was warmly embraced by the then Minister of Education of Cyprus, Claire Angelidou.

This conference was destined to become the spark: one year later, occasioned by this meeting, the Hellenic Society of Rheology was born, of which Andreas was a key founding member. Beyond his conference and organizational work, however, Andreas Alexandrou also left behind a great authorial legacy. His personal book, *Principles of Fluid Mechanics*, is distinguished to this day for its pedagogical excellence, proving his worth as an academic teacher. However, the ultimate culmination of his dedication to his mentor and of their shared journey was the monumental textbook *Viscous Fluid Flow*—a work of the Professor Papanastasiou which he edited together with Georgiou. It is a manual that, more than 25 years after 1999, continues to be taught in the top universities of the world, constituting at the same time the main textbook in the Fluid Mechanics course at the University where I serve. This is, ultimately, the most substantial legacy: for his work to continue to shape the scientists of tomorrow.

In parallel, the Hellenic Society of Rheology did not merely develop over the years, but it grew immensely. And it did so standing firmly upon the ethos and the spirit of cooperation that was instilled by Andreas Alexandrou, through his uninterrupted presence as an active member and dynamic President. Allow me to say that today, the Greek-Cypriot rheology community enjoys worldwide recognition. The culmination of this respect came three years ago: our Society, under the presidency of Professor Dimitris Vlassopoulos—President of the ICR and our founding member—hosted with absolute success the 19th International Congress on Rheology in Athens. A milestone which, without a doubt, would have made Andreas unimaginably proud.

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The term "Homo Universalis"—meaning the universal, Renaissance man—describes in the most ideal way the entity of Professor Alexandrou. Despite the immense burden of cutting-edge scientific research and the maelstrom of administering a dynamically developing University, Professor Alexandrou categorically refused to be confined to the narrow, one-dimensional role of the technocrat scientist. His personality was composed of multiple facets of social sensitivity and awareness. He was not a man who adored only his science, but one who, above all else, adored passing on the flame. He did not look only towards the top. He always looked towards the essence. He looked at the youth and their progress.

Ladies and gentlemen, in his research, Professor Alexandrou engaged intensely, among other things, with fluids that exhibit yield stress (yield-stress fluids). These are materials which behave like solids, like rigid bodies, until a critical stress value is exerted upon them—in simple words, a critical pressure—and then everything changes. The compact structure breaks, deconstructs, collapses, and in the end, flows. For 11 whole years, Andreas fought strenuously, without complaint, silently, an unimaginably epic battle. And there, he proved in practice his own theory, in contrast to that of the materials he adoringly studied. He refused to yield. He refused to "collapse". Instead, he faced physical decline with a noble dignity, with a constant smile, entering the amphitheaters to teach while in pain, continuing to guide his doctoral candidates and his collaborators, and remaining the rock of his family and of our academic community. The Hellenic Society of Rheology, in 2019, dedicated its international conference in Samos exclusively to his memory, while it published an honorary issue in the journal *Physics of Fluids* of the American Institute of Physics Publishing.

Today, the Faculty of Engineering of the University of Cyprus is doing something much greater than just baptizing a space. With the naming of the Amphitheater "Andreas Alexandrou", the University of Cyprus places Andreas himself in his natural space: among the students, or to be spiritually accurate, among *his* students. That is how he considered all progressive and eager-to-learn young people.

Every time a young student crosses these doors, they will behold not simply the name of a great engineer, but the spirit of a noble, uncompromising human being. Of a free academic spirit who taught us how to find the strength inside our very own soul.

Andreas, on behalf of the entire rheological community, we thank you for all that you taught us with your stance on life and your character.

Ladies and gentlemen, thank you very much.