

CURICULUM VITAE

Hon. Prof. Dr.-Ing. Ognjan Božić

1. List Specific Outstanding Accomplishments and Contributions

Research activities by air depot center „ORAO“– Rajlovac by Sarajevo, Former Republic Yugoslavia – B&H (Years 1988 – 1991)

Test bed for combustion chambers of the jet engine RD29 (Research work by air depot “ORAO” (English: „Eagle“), Rajlovac, Republic B&H). There he worked as *project manager and chief designer* for the development of a test bed and improved combustion chambers of the jet engine RD29 (used for jet propulsion of the jet fighter MIG 21 BIS). The aim of the project was a redesign of the combustion chamber, which results in higher combustion temperature and higher efficiency. This allowed the flight radius of jet fighters MIG21 to increase by 10%. His contribution to this project included also CFD modeling of flow and combustion processes within the 3D cylindrical combustion chamber R29 (CFD code PHOENICS, CHAM London, GB).

Research activities by German Aerospace Center – Institute AS, Braunschweig, Germany (Years 2000 – 2019)

X-38 / CRV - rescue vehicle for the crew of the International Space Station (joint NASA / ESA project). Position: *team member*. Task: Calculation of aerothermal loads of the spacecraft in specific flying path points during reentry into the Earth's atmosphere at hypersonic flight conditions. Years 2000-2001.

Ariane 5 / Liquid Fly Back Booster (LFBB) - DLR concept for a reusable launch vehicle. Position: *team member*. Task: Determination of air flow interactions between two LFBB vehicles and the central stage of Ariane 5 launcher under subsonic, transonic, supersonic and hypersonic conditions. Years 2002-2003.

SHEFEX (Sharp Edge Flight Experiment) - the first independent DLR Space Exploration experiment was carried out in 2005. Position: *team member*. Task: Design of the aerodynamic shape of this new capsule and the implementation of initial CFD aerodynamic calculations with DLR TAU code to determine forces and moments acting on the capsule. Year 2003.

EXPERT flight experiment - an ESA project. *Team member*. Task: CFD simulation of aerothermal loads that occur under critical hypersonic flight conditions on the reentry vehicle. Years 2004-2005.

MHD propulsion - research for potential applications of electric hydrodynamics (EHD) and Magneto-Hydrodynamic (MHD) within an internal DLR- Institute AS study. Exploratory focus of study was the concept for a MHD propulsion system. *Study Manager and head researcher*. Years 2004-2005.

Electromagnetic suborbital/ orbital Lorentz accelerator (RAILGUN) realized on behalf of ESA and EADS – Bremen (today AIRBUS DS). Start and introduction of small payloads into orbit using a Lorentz accelerator. *DLR study Manager and head researcher*. Years 2003-2004.

Moon 2016 Sample Return Mission (robotic lunar return mission). *Study Manager*. Study was carried out on behalf of the DLR Executive Board. Years 2005-2007.

Electric Magnetic Launcher (EMAIL) – Preliminary project. *Project Manager*. The project was started in 2009 with the the goal to develop a rocket projectile, accelerated by means of EMAIL. In the first phase one suborbital launcher for small payloads up to 5 kg and altitudes up to 120 km should be developed (scheduled originally by 2014, but in year 2012 stopped). Years 2008-2011.

AHRES (Advanced Hybrid Rocket Engine Software) – Project manager. The project was launched in 2009 and aims to develop a software tool that is able to design large hybrid engines within a short period. For the validation of the software a test stand was designed, manufactured and assembled at the DLR test range Trauen (Germany). The two self-designed hybrid rocket engines are tested and qualified on this test stand in the years 2012 - 2015. Also, he was Design Manager for hybrid rocket test engine *VISERION* with thrust 12 kN in the year's 2016 - 2017.

ARIANE 6 PPH solid boosters P135/145. Position: manager for the solid rocket booster package. For the future ESA launcher, a preliminary design of solid fuel boosters (weighing about 148/160 t) was performed. The preliminary design of the P135 and P145 solid boosters is part of his activities within the DLR X-TRAS expert group. Years 2013-2014.

AHREUS hybrid rocket upper stage motor for the VLM 1 launcher. For the Brazilian rocket launcher VLM 1 a preliminary hybrid rocket engine was designed (weight 884 kg). The preliminary design is part of his activities within the DLR X-TRAS expert group. *Study Manager.* Year 2014.

VIHOR the pre-design study for DLR two stage sounding rocket with chemical hybrid rocket engines. Study Manager. Years 2016-2018.

2. Record of Professional Experience (*principal positions held and responsibilities including dates*):

1980 -1982. Concern UNIS - Company "Pretis", Department "RAZVOJ" (development) Vogošća-Sarajevo, Republic B&H. Project Engineer for the development of missiles. Tasks: aerodynamic analysis and flight path calculations for rocket projectiles.

February 1982 – 1988. Faculty of Mechanical Engineering of University Sarajevo - Department of Power Engineering, Process Technology and Motor Vehicles (1) (EPTM - 50% working time) and Institute of Energy, Process Engineering and Environmental Technology (2) (IPES - 50% working time). Assistant(1) / Research Staff for flow and combustion processes (2). Head of the Laboratory for IPES Energy Systems and member of the Scientific Council of the Faculty of Mechanical Engineering Sarajevo (1984-1988).

1988 – 1992. Air depot "Orao" Rajlovac by Sarajevo. Position: research engineer. Since 1989 Project as Project Manager responsible for the development of a test stand for combustion chambers of the jet engine RD29 for fighting jet MIG-21 BIS.

1993 – 1996. Božić GmbH, Braunschweig - Branch Manager for computer technology. His task included additional computer training of company personnel.

1996 – 2000. Technical University "Carolo Wilhelmina" Braunschweig, Institute of Heat and Fuel Technology. *Research assistant/ software developer* for the CFD code FLOREAN (Flow Reaction code).

2000 - 2019. German Aerospace Center (DLR), Institute of Aerodynamics and Flow Technology, Braunschweig. *Researcher*

2010 - 2020. Lecturer of space propulsion at the master`s degree level of Technical University - Braunschweig (Germany). Since 2016 is elected as honorary professor.

3. Academic Degrees (*Conferred by institutions of higher education, such as universities*):

In December 1979 he graduated at Mechanical Faculty of University Sarajevo as **mechanical engineer**; Diploma thesis: "Preliminary design and analysis of the aerodynamic characteristics of rocket projectiles for air defense," Grade: Thesis (9) [scale: 5 to 10]

In March 2002 he received the **Ph.D. degree** from the Faculty of Electrical and Mechanical Engineering of Technical University "Carollo Wilhelmina", Braunschweig, Germany with a dissertation related to the CFD modeling of multiphase combustion processes. Dissertation title: "Numerical simulation of mineral transformation in pulverized coal furnaces".

In year 2008 elected at Mechanical Faculty of the University Sarajevo, Republic B&H as **assistant professor for lectures on aerodynamic and flight mechanic**.

In 2010, he was elected as **lecturer for space propulsion** at the Technical University Braunschweig (master degree level) working permanently until 2020. In the year 2016 at the Technical University Braunschweig is elected as *honorary professor*.

4.. List Principal Scientific/Technical/Professional or Academy Memberships (and highest grade attained) and Activities and Other Noteworthy Pertinent Accomplishments in the Candidate's Field of Study (member/corresponding member of national/international Academy (Sciences, Engineering etc.), boards, committees, advisor, consultants, important offices held and other pertinent contributions):

1973 – 1975, also 1978 and 1981. Chairman of the "Astronautic and Rocket Society" of the University Sarajevo, Republic B&H (Univerzitetско Astronautičko-Raketno Društvo Sarajevo - UARD).

1973 – 1988. **Instructor for rocket technique** of the Yugoslav Astronautic Rocket Society (JARD - former IAF Member until 1991). As instructor: trained more than 300 JARD members to design and build experimental rockets (Level 2-3).

1974 – 1979, also 1982. Chairman of the Astronautic and Rocket Association of Republic B&H " (Astronautički i Raketni Savez BiH – ARS BiH).

1976 – 1978. Member of the Executive Board of the National Technical Association of the Republic of B&H (Narodna Tehnika BiH - Predsjedništvo).

1980 – 1982. Member of the Executive Board of the Yugoslav Astronautic and Rocket Association (SAROJ/former JARD) - IAF member organisation.

1974 – 1982. Editor in Chief of scientific and technical journal "Overview of Rocket Technique " (Pregled raketne tehnike). Publisher: Astronautic and Rocket Association of Republic B&H.

2004 - 2016. Full member of the "European Electromagnetic Launch Society" (EEMLS);
Deputy Chairman of EEMLS (October 2013 – October 2016).

2007 – 2010. Coopted as temporary member of Working Group on "Future Propulsion Systems" by the International Academy of Astronautics (IAA) at the International Astronautic Federation (IAF).

Since 2011. Full member of the "Deutschen Gesellschaft für Luft- und Raumfahrt - Lilienthal-Oberth E.V. " (German Society for Aerospace), DGLR No. 5180; since 2013 *Head of the Committee for solid and hybrid rocket propulsion*.

Since 2011. *Member* of "The British Interplanetary Society" (Elected member).

Since 2015. Corresponding Member of the International Academy of Astronautics (IAA)
- Engineering section (2).

Since 2019. Full Member of the International Academy of Astronautics (IAA).
- Engineering section (2).

Since 2018. Full member of Adriatic Aerospace Association, Croatia, Zagreb. Coordinator for ESA and National Agencies.

Reviewer by ***Astronautica Acta*** (Journal, Elsevier) and **CEAS Space Journal** (Springer Verlag).

6. Professional Recognition

(honors, awards, prizes, honorary degrees)

Silver Honour Schield „ Boris Kidrič“ - in recognition for outstanding achievement in dissemination of technical culture of youth; „Narodna tehnika R B&H“ (National Tehnique Association of Republic Bosnia and Hercegovina), Sarajevo, 1976.

SARAJEVO Gold Plaque Award - in recognition for outstanding achievements in dissemination of rocketry knowledge for youth; Savez Astronautickih i Raketnih Organizacija Jugoslavije – SARAJEVO (English translation: Yugoslav Astronautic and Rocket Society –JARD), Belgrade, former Yugoslavia, 1980.

SARAJEVO Gold Bedge – Instructor for rocketry (Level 1 – highest); Savez Astronautickih i Raketnih Organizacija Jugoslavije – SARAJEVO (English translation: Yugoslav Astronautic and Rocket Society –JARD), Belgrade, former Federal Republic Yugoslavia, 1981.

Who's Who in the World (Marquis, New Providence, N.J., USA) – selected biographical profile for inclusion in the 25th Silver Anniversary Edition of Who's Who in the World (Year 2007). The special anniversary edition feature biographies of more than 50.000 of the most accomplished men and woman from around the globe and across all fields of endeavor.

Honorary professor of space propulsion at Technical University Braunschweig, Germany on the master`s degree level since 2016.

Date: 20.07.2020

Hon. Prof. Dr.-Ing. Ognjan Božić