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Sarajevo, 24. 1. 2023. godine

Bosna i Hercegovina-Federacija Bosne i Hercegov.
Kanton Sarajevo - GRAD SARAJEVO

GRADSKO VIJEĆE

PRILOG BROJ: 25 JAN 2023	
Opis: Broj	Prilog
01-01-04 - 117/23	

GRAD SARAJEVO GRADSKO VIJEĆE
ODBOR ZA DODJELU „ŠESTOAPRILSKE NAGRADE GRADA SARAJEVA“

Hamdije Kreševljakovića broj 3/1
71000 Sarajevo

Predmet: Prijedlog za dodjelu Šestoaprilske nagrade Grada Sarajeva u 2023. godini akademiku Kemalu Hanjaliću

Poštovani,

u odzivu na *Javni poziv o uslovima i načinu predlaganja kandidata za dodjelu „Šestoaprilske nagrade Grada Sarajeva“ u 2023. godini*, Skupština Akademije nauka i umjetnosti Bosne i Hercegovine (ANUBiH) održana u periodu 19–23. 1. 2023. godine, donijela je Odluku da predloži akademika Kemala Hanjalića za kandidata za dodjelu Šestoaprilske nagrade Grada Sarajeva u 2023. godini za oblast *nauka i obrazovanje*.

Akademik Kemal Hanjalić je član Akademije nauka i umjetnosti Bosne i Hercegovine više od 40 godina, emeritirani profesor Univerziteta u Sarajevu i Fakulteta primjenjenih nauka Tehnološkog univerziteta u Delftu i državljanin Bosne i Hercegovine. Po svim objektivnim kriterijima akademik Kemal Hanjalić je međunarodno najpriznatiji naučnik u Bosni i Hercegovini i spada među nekoliko najuspješnijih i najpriznatijih naučnika u regiji.

Njegov impresivni naučni, stručni i obrazovni opus kao i društveni doprinos, posebno razvoju nauke i visokog obrazovanja u Sarajevu, Bosni i Hercegovini, pa i šire, su dobro poznati javnosti i u Sarajevu i u Bosni i Hercegovini. Smatramo da je svojim opusom i decenijskim predanim naučnim, pedagoškim i društvenim djelovanjem dao veliki doprinos razvoju i međunarodnoj afirmaciji Grada Sarajeva i Bosne i Hercegovine širom svijeta, što se može vidjeti iz priložene biografije i bibliografije (dostupno i na web stranici ANUBiH: <https://www.anubih.ba/index.php/bs/clanstvo/redovni-clanovi>), a posebno je obrazloženo u prilogu koji opisuje najvažnija dostignuća i zasluge kandidata. Smatramo da akademik Kemal Hanjalić ima sve reference za ovu nagradu u kategoriji *nauka i obrazovanje*.

Kao neposredni povod za ovu kandidaturu navodimo nedavno (2022. godina) objavljenu SCOPUS listu 2% najcitatiranih autora u svijetu u kojoj je akademik Kemal Hanjalić uvršten i visoko rangiran (u prvih 25%), te njegovu nedavno (takoder 2022. godina) izdatu knjigu "Modelling Turbuence in Engineering and the Environment", drugo dopunjeno i prošireno izdanje, Cambridge University Press, UK. Skrećemo pažnju na pohvalni prikaz prvog izdanja knjige (izdate 2011. godine) koji je objavljen 2012. godine u SIAM Review (Society for Industrial and Applied Mathematics, USA), u prilogu.

S poštovanjem,

Akademik Muris Čičić, s.r.
Predsjednik ANUBiH

Prilozi:

1. Radna biografija kandidata,
2. Taksativni biografski rezime sa detaljnijim podacima o aktivnostima i priznanjima kandidata (na engleskom jeziku),
3. Rezime posebnog doprinosa i zasluga u oblasti nauke i obrazovanja,
4. Pismena saglasnost kandidata da prihvata kandidaturu za predloženu oblast,
5. Odluka Skupštine ANUBiH o predlaganju akademika Kemala Hanjalića za kandidata za dodjelu Šestoaprijske nagrade Grada Sarajeva u 2023. godini,
6. Zakon o Akademiji nauka i umjetnosti Bosne i Hercegovine kojim se dokazuje da je Skupština najviši organ upravljanja Akademije,
7. Fotokopija korica knjige K. Hanjalić i B. E. Launder, drugo izdanje (CUP 2022) sa pohvalom (Praise for the first edition).

Akademik Kemal HANJALIĆ

Biografija



Kemal Hanjalić je rođen 30.11.1939. god. u Sarajevu, gdje je završio osnovnu školu, gimnaziju i Mašinski fakultet. Nakon diplomiranja 1964. god. zaposlio se kao stručni saradnik u Istraživačko-razvojnom centru (kasnije Institut) za termotehniku i nuklearnu tehniku, ITEN-Energoinvest. Istovremeno je izabran za asistenta na Mašinskom fakultetu.

Podstaknut planovima preduzeća Energoinvest da ovlada tehnologijom za proizvodnju opreme za nuklearne elektrane, kao dobitnik stipendije Britanskog fonda 1965. god. upisuje se na 'Postdiplomsku školu iz termodinamike i srodnih disciplina' na Univerzitetu u Briminghamu, UK, gdje 1966 stiče M.Sc. Nakon toga, kao stipendist Central Electricity Generating Board (tadašnja britanska 'Elektroprivreda') počinje rad na doktorskom projektu o hladjenju nuklearnih reaktora na Imperial College-u of Science and Technology u Londonu, gdje boravi tokom 1966-67 i 1968-70. Doktorsku disertaciju (PhD) je odbranio 1970. godine na Univerzitetu u Londonu.

Po povratku iz Londona nastavlja raditi u ITEN-u i na Mašinskom fakultetu, gdje je 1968. god. biran u zvanje predavača na predmetu Toplotne mašine. Od 1971. god. je zaposlen na Mas. fakultetu, ali nastavlja angažovanje u ITEN-u do 1980. godine. U zvanje docenta biran je 1972., van. profesora 1976., a redovnog 1979. god. Od 1973. god. predaje i Dinamiku stišljivog fluida, a od 1983. god. Mehaniku fluida. Godine 1972. je organizovao i duže vremena rukovodio prvim postdiplomskim studijem iz energetike i procesne tehnike na Maš. fakultetu u Sarajevu.

U julu 1991. godine odlazi na jednogodišnji boravak na Univerzitet Erlangen-Nürnberg kao gostujući profesor Njemačkog naučnog društva (DFG). Zbog rata u BiH produžava boravak, a 1993. prihvata mjesto profesora na Tehnološkom univerzitetu Michigan-a u SAD. Već 1994. prelazi na Tehnički univerzitet Delft u Nizozemskoj gdje je izabran za profesora i rukovodioca Odsjeka za termo-fluidne nauke na Fakultetu za primijenjenu fiziku. Nakon emeritiranja 31.3.2005 do septembra 2006. radi kao gostujući profesor na Tehničkom univerzitetu Darmstadt, zatim kratko na Univerzitetu za primjenjene nauke Krakow, Poljska. U 2007. god. prihvata trogodišnji angažman na Departmanu za mehaniku i aeronautiku (DMA) Sapienza Univerziteta u Rimu kao profesor i titular EU katedre Marie Curie sa misijom da podigne naučni nivo DMA u oblasti svoje ekspertize. Godine 2011 dobiva 'Lead scientist grant' Ministarstva za nauku i visoko obrazovanje Ruske Federacije (5 mill, US\$) za osnivanje Laboratorije za simulacije energetskih procesa pri Univerzitetu Novosibirsk i Institutu za Termofiziku Ruske akademije nauka.

Naučna djelatnost Kemala Hanjalića obuhvata fundamentalna i razvojna istraživanja, te primjene u oblasti termo-fluidnih nauka, posebno hidro- i termo-tehnike, energetike i okoliša:

- razvoj matematskih modela turbulentnog strujanja fluida i transportnih procesa (prenos toplote i mase, sagorijevanje), sa primjenom na simulaciju procesa u inženjerskim sistemima;
- matematsko simuliranje termičkih i strujnih procesa u aparatima, mašinama i postrojenjima hidro- i termo-tehnike i energetike, te procesa u prizemnoj atmosferi i vodotocima;
- laboratorijska istraživanja fenomena turbulencije, sagorijevanja, magneto-hidrokinamike, performansi toplotnih mašina i uređaja, te prizemnih meteoroloških i vodnih strujanja;
- razvoj i optimiziranje aparata i postrojenja, te dijagnostička, verifikaciona, prijemna i druga ispitivanja termoenergetskih postrojenja i njihovih komponenti.

Objavio je samostalno ili sa ko-autorma preko 500 radova od kojih 265 u časopisima indeksiranim u Web of Science i Scopus bazama, 5 knjiga, te uredio (editor) 17 zbornika i monografija (Cambridge Univ. Press, Springer, Taylor & Francis, Begell House, Delft Univ. Press, Svjetost). Spada među međunarodno najpriznatije naučnike u BiH, pa i regiji. Uvršten je i visoko rangiran (među prvih 25%) u Scopus listu 2% najcitiranijih autora u svijetu. Ima reputaciju jednog od pionira i vodećeg naučnog autoriteta u oblasti matematskog modeliranja turbulencije. Metodi i modeli, publikovani sa B. Launderom (J. Fluid Mech., 1972/75) poznati u literaturi kao Hanjalić-Launder (HL) modeli, citirani su i obradjivani u brojnim časopisima i knjigama (često kao zasebno poglavlje, na pr. D.C. Leslie, 'Developments in the theory of

turbulence', Clarendon Press Oxford, 1973, i drugi). Ovi modeli i kasnije verzije koje je razvijao sa saradnicima su ugrađeni u brojne istraživačke i komercijalne CFD (Computational Fluid Dynamics) software. Numeričko simuliranje turbulentnog magnetnog dinama, publikovano sa S. Kenjereš-om u Phys. Rev. Letters, 2007, kojim je ponudjen novi uvid u mehanizam generisanja i održanja Zemljinog magnetog polja, citiran je kao udarna vijest (newsflash) u brojnim naučno-popularnim i drugim medijima (Science Daily, Science News, Eureka Alert, Alpha Galileo News, Terra Daily, Washington DC News, NRC Handelsblad, The Times of India, Malaysia Sun, i dr).

Dao je i značajan doprinos razvoju novih uređaja i procesa u termotehnici i termoenergetici, posebno klipnih i zavojnih kompresora (sa N. Stošićem, realizirani u tvornici Trudbenik, Energoinvest), novog metoda gasifikacije uglja (sa M. Sijerčićem), pulzirajućih gorionika, te detonacionog otklanjanja naslaga u velikim ložistima (dva patenta, sa I. Smajevićem, višestruko citirani u U.S Patents), koji je realiziran i u pogonu 1983 -2011 na dva kotla u TE Kakanj.

Bavio se i publicirao radove o problemima organizovanja naučno-istraživačkih i razvojnih djelatnosti, posebno na univerzitetima, te vrednovanju naučno-istraživačkog rada i institucija.

Obavljao je više stručnih i društvenih funkcija: direktor Instituta za procesnu tehniku, energetiku i tehniku životne sredine (IPES) (1980-1984), (pro)dekan (1975-78) i dekan Mašinskog fakulteta u Sarajevu (1984-85), gradonačelnik Sarajeva (1985-87), član Izvršnog vijeća BiH (1987-91) kada je pokrenuo i vodio izradu prve Strategije naučno-tehnološkog razvoja BiH (Skupština BiH 1990.), te kapitalni projekat opremanja i revitalizacije istraživačke i pedagoške opreme na univerzitetima u BiH iznosom od 19 mill US\$, realiziran djelimično u 1990/91. Bio je delegat Jugoslavije u Komitetu za životnu sredinu OECD-a u Parizu (1982-90), predsjednik Savjeta zajednica za naučni rad Jugoslavije (1987-88), te predsjednik Zajednice gradova i opština Jugoslavije (1985-86). Kao dekan, 1984. godine aktivirao je industrijski konzorcij za Mašinski fakultet u Sarajevu, te pokrenuo i vodio izgradnju nove zgrade, koja je dovršena 1989. godine. Nakon rata, pokrenuo je i sa Prof. F. Durst-om (Univ. Erlangen) vodio grant-projekat Njemačke vlade (2,1 mil KM) za obnovu ratom devastiranih laboratorija, istraživačke i pedagoške infrastrukture i aktivnosti na Maš. fakultetu u okviru kojeg je organizovano šest ljetnih škola (1997-2002) uz učešće oko 200 sudenata, pretežno sa UNSA.

Predavao je na univerzitetima u Ex-Jugoslaviji (Zenica, Banja Luka, Maribor, Novi Sad, Titograd, Zagreb) i inostranstvu (Almaty, Cambridge, Göteborg, Darmstadt, Erlangen, Imperial College, Krakow, Kyoto, Novosibirsk, Rim, Singapur, Tokyo, UC Davis, Michigan Techn. Univ., NASA Langley Res. Center). Održao je oko 80 plenarnih/keynote predavanja na međunarodnim skupovima, neka u statusu 'distinguished lecturer' (Ohio Space Institute, Texas A&M University, Data Storage Institute, DSI Singapore), te brojna seminarska predavanja širom svijeta.

Kao mentor vodio je oko 40 doktoranata i brojne magistrante i postdoktorante od kojih su 5 profesori na renomiranim univerzitetima, a većina vodeći stručnjaci u industriji u EU i SAD.

U periodu 2005-2015 bio je glavni urednik časopisa 'Flow, Turbulence and Combustion' (Springer) i član uređivačkih odbora više međunarodnih časopisa. Od 2015-2018 bio je predsjednik Međunarodnog centra za prenos toplote i mase (ICHMT, Ankara), te član rukovodećih tijela međunarodnih naučnih i stručnih asocijacija ERCOFTAC i IAHR

Dobio je više nagrada, odlikovanja i priznanja: plakete Univerziteta u Sarajevu (1984, 1986), odlikovanja: Orden rada sa srebrenim vijencem SFRJ (1980), Predsjednika Republike Finske (Commander 1st Class in the Order Lion of Finland, 1987) i Kraljice Nizozemske (Officer in the Order Oranje-Nassau, 2010), 27-julska nagrada BiH (1987), prestižne međunarodne nagrade za naučna ostvarenja: 'Max-Planck' (Njemačka, 1992), 'Nusselt-Reynolds' ExHFT (2021), 'Crystal Space Shuttle' Univ. Texas A&M (SAD 2007), viši doktorat (DSc) Univerziteta u Londonu (UK, 1998), te počasne doktorate (Dr.h.c.) Univerziteta Reims, Champagne i Ardenne (Francuska, 2009) i Int. Univerzitet Burch (Sarajevo 2018).

Za dopisnog člana Akademije nauke i umjetnosti BiH izabran je 1981., a za redovnog 1987. god., za inostranog člana (Fellow) Kraljevske akademije za tehniku UK (FREng, 2005) i Ruske akademije nauka (RAN, 2019), člana (Fellow) Svjetske Islamske akademije nauka (IAS, Aman, JO, 2006), te člana (Fellow) Instituta za fiziku UK (FInstP, 2004), Američke asocijacije mašinskih inženjera (FASME, 2005) i Međunarodnog centra za prenos toplote i mase (F-ICHMT, 2005).

Akademik KEMAL HANJALIĆ
Curriculum Vitae (itemized, January 2023)

Professor Kemal Hanjalić, PhD, DSc, Dr.h.c.,
Member ANUBiH, Foreign Member RAS, (Int) FREng, FIAS, FASME, FInstP, FICHMT
Emeritus Professor, Univ. of Sarajevo (BH) and Faculty of Applied Sciences, Delft Univ. of Technology

Education:

1970 Ph.D. (Fluid Mechanics) Imperial College, Univ. London, U.K.
1966 M.Sc. (Thermodynamics and Related Studies) Univ. Birmingham, U.K.
1964 Dipl. Ing. (Mechanical Engineering - Energy Engineering) Univ. of Sarajevo, Yugoslavia

Professional Appointment/Employment:

Academic/Research positions:

2011-16 Lead Scientist, Novosibirsk State University / Institute for Thermal Physics SB RAS, Russia
2007-10 (EU) Marie Curie Chair holder, Dept. of Mechanics and Aeronautics, Sapienza Univ. of Rome, Italy
2005-06 DAAD Guest Professor, Darmstadt University of Technology, Germany
1994-05 Professor and Head of Thermo-Fluids Section, Faculty of Applied Sciences, Delft University of Technology, Delft, The Netherlands
1993-94 Professor, Mechanical Eng. Dept., Michigan Technological University, USA
1991-93 Guest Professor of the German Research Association (DFG/Humboldt Foundation), Friedrich-Alexander Univ. Erlangen-Nuremberg, Germany
1979-91 Professor of Fluid Mechanics and Turbomachinery, Faculty of Mech. Eng. Univ. of Sarajevo
1964-79 Assistant / Lecturer/ Assoc. Professor, Faculty of Mech. Eng. Univ. of Sarajevo, Yugoslavia
1964-79 Research Assistant/ Researcher/ Scientific Advisor, Institute of Thermal and Nuclear Engineering, Energoinvest Co, Sarajevo, Yugoslavia.

Administrative positions:

1987-91 Cabinet Minister (Science and Technology) in the Government of Bosnia and Herzegovina
1985-87 Mayor of Sarajevo
1984-85 Dean of the Faculty of Mechanical Engineering, University of Sarajevo
1980-84 Director, Institute for Process- Power and Environmental Engineering, Sarajevo
1975-78 Head of the Sarajevo Department, Faculty of Mechanical Engineering, University of Sarajevo

Professional and Research Areas

Fluid Mechanics, Thermodynamics, Heat and Mass Transfer, Thermal and Fluids Machinery and Equipment, Energy and Environmental Engineering, Turbulence and Computational Fluid Dynamics

Honours and Awards (selected):

- Royal Decoration of the Netherlands "Officer of the Order of Oranje-Nassau", 2010
- State Decoration of Finland "Commander 1st Class, Order of Lion of Finland" 1987
- Elected (Foreign) Member of the Russian Academy of Sciences, (2019)
- Elected Member (Fellow) of the World Islamic Academy of Science, (IAS), Amman, Jordan, (2006)
- Elected REng – International Fellow of the Royal Academy of Engineering, UK (2005)
- Elected Member of the Academy of Sciences and Arts of Bosnia and Herzegovina (corresponding member from 1981, full member (Fellow) from 1987)
- Fellow of ICHMT (International Centre for Heat and Mass Transfer, Secretariat in Ankara Turkey 2006)
- Fellow of ASME (American Association of Mechanical Engineers, 2006)

- Fellow of the Institute of Physics (UK, 1999)
- D.Sc.(Eng), University of London (1998) (higher doctorate *"for published work of a high standard containing original contributions to the advancement of knowledge and learning which has given the candidate distinction in his field of study"*)
- Dr. h.c. (Doctor honoris causa), International Burch University, Sarajevo, Bosnia & Herzegovina, 2018
- Dr. h.c. (Doctor honoris causa), University of Reims, Ardenne and Champagne, France, 2009
- Nusselt-Reynolds Prize, ExHFT (Assembly of World Conferences on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics) *"for his outstanding contributions to the modelling of turbulent fluid flow and heat transfer, which constitute the cornerstone of the computational fluid dynamics (CFD), and for devising smart experiments to support his arguments and validate the models."* (2021) (every 4th year)
- Luikov Medal, IICHMT, (International Centre for Heat and Mass Transfer, ICHMT), *"for outstanding contributions to the science and art of Heat and Mass Transfer."* (2022) (awarded every two years)
- Max-Planck Research Prize *"for achievements in turbulence research"* (with F. Durst), Germany, (1992)
- Distinguished Lecturer, Ohio State University, Cleveland, Ohio USA, June 2000
- Crystal Space Shuttle Award, Dept. of Aeronautics, Texas A&M University, USA, February 2007.
- Nominated and *shortlisted* (three times) for the Global Energy Prize, Moscow, Russia

Visiting posts (researcher/ fellow / professor, by invitation)

- Imperial College of Sci. and Techn., Mech. Eng. Dept., London, 1972, 1973; 1974
- University of California at Davis, 1978, 1979, 1980
- "Friedrich-Alexander" University Erlangen-Nuernberg, 1984, 1991-93
- Institute for Computer Applications in Science and Engineering - ICASE/NASA Langley Res. Lab., 1995
- Kyoto University Foundation, Kyoto University, 1996
- Cambridge University, Isaac Newton Institute for Mathematical Sciences, 1999
- Chalmers University of Technology, Gothenburg, Sweden, 2000
- Imperial College of Science, Technology and Medicine, Aeronautics Dept., 2001, 2002
- University of Rome "La Sapienza", 2003
- National University of Singapore – Institute for Mathematical Sciences, 2004
- Darmstadt University of Technology, Germany (April 2005-Sept 2006)
- Data Storage Institute, Singapore, Distinguished Visitors Programme, 2006
- Marie-Curie Mobility Programme, AGH University, Krakow, Poland, 2006/07
- Plumer Visiting Research Fellow of St Anne's College/Osney Thermo-fluids Lab., Oxford Univ., 2017

Membership and Functions in Professional Organizations:

- American Association of Mechanical Engineers (ASME, Fellow),
- American Physics Society (APS),
- International Association of Hydraulic Research (IAHR)
- European Research Community for Flow, Turbulence and Combustion (ERCOFTAC) ,
- Past member of the Scientific Programme Committee and of the Ind. Advisory Committee, ERCOFTAC
- Past Chairman of the ERCOFTAC Special Interest Group (SIG) for Turbulence Modelling
- Past Chairman of the IAHR Working Group on Refined Flow Modelling
- President (2015-2018), past Vice-President and Chairman of the Executive Committee, Member of the Scientific Council, ICHMT (Int. Center for Heat Mass Transfer, Secretariat in Ankara Turkey)

Official and Representative Functions (selected):

- President of the Yugoslav Association of Republican Research Foundations (1987/89)
- President of the Yugoslav Association of Towns and Communes (1985/87)
- Representative of Yugoslavia in the OECD Environmental Committee - Air Management Policy and Energy and Environment Groups (Paris, Fr, 1984-1991)

Journal Editorship (past and current):

- Editor-in-Chief, Int. Journal "Flow, Turbulence and Combustion" (Kluwer/Springer) (2005-15)
- Member of the Editorial Advisory Board of the Int. Journal of Heat and Fluid Flow (Elsevier)
- Member of the Editorial Advisory Board, Journal of Turbulence, Taylor and Francis
- Member of the Advisory Board, Int. Journal of Thermal Sciences (Elsevier)
- Member of the Editorial Board, Int. J. of Fluid Dynamics (Research India Publications)
- Honorary Editorial Advisory Board, Int. J. Heat and Mass Transfer (Pergamon/Springer)
- Honorary Editorial Advisory Board, Int. Communications in Heat and Mass Transfer (Springer)

Organizer and (Co-)Chairman of International Conferences and Workshops (1990-2019):

16 international conferences + 1 international workshop (Sarajevo, Lisbon, Erlangen, Delft, Nagoya, Antalya, Dubrovnik, Rome, Palermo, Sarajevo, Rio de Janeiro...). Also Member of Scientific and Advisory Committees of a number of international conferences

Invited keynote, panel and other lectures at international conferences and workshops, short courses

- over 80 invited keynote lectures at international conferences and other events
- over 70 invited seminar lectures worldwide
- Lectures series (invited) in short graduate/doctoral courses (Belgium, Germany, India, Italy, Japan, Kazakhstan, Poland, Russia, Singapore, UK, USA, NI) among which (selected):
 - Instructional Conference, Isaac Newton Institute of Mathematical Sciences/The Royal Academy of Engineering UK, Univ. of Cambridge, 1999
 - Von Karman Institute of Fluid Dynamic, Rhode Saint Genese, Belgium (2004,2002,2000,1984)
 - Delft University of Technology – JM Burgerscentrum – Research School for Fluid Mechanics (Biennial postgraduate/postdoctoral short courses, 1995-2006)
 - Institute of Thermal Physics, Russian Academy of Sciences, Novosibirsk (2002, 2011-16)
 - Polish Academy of Science/ERCOFTAC Pilot Centre Summer School, Chestohowa, Poland (2001)
 - University of Erlangen, Germany, "Turbulenz", "NUMET", (biennial short courses, 1993-2008)
 - University of Tokyo / JSME Thermal Engineering Division, Tokyo, Japan (2000)
 - Michigan State University, East Lansing, Michigan, USA (2000).
 - University of California at Davis, USA (1978, 1980)
 - Course organizer and lecturer in the Int. Summer Academy, sponsored by German Ministry of Economic Affairs (Sarajevo, BH, 1997, Makarska, 1998, Pula, 1999 and Dubrovnik 2000, 2001, 2002, Croatia)
 - National University of Singapore – Institute for Mathematical Sciences, (2004)
 - DSI (Data Storage Institute), Singapore, lecture series, October (2006).
 - Summer school of Thermodynamics, lecture series (Sapienza University), Rome (2009), Anzio (2010)
 - Al-Farabi Kazakh National University, Almati, Kazakhstan (2010, 2011)
 - Politecnico di Milano, Italy, (2011)
 - Silesian University of Technology, Institute of Thermal Engineering, Gliwice, Poland (2011)

- ERCOFTAC SIG15 (Special Interest Group) on Turbulence Modelling, 15th Workshop, Oct 17-18, 2011, Chateaux de Vincennes, Paris
- ERCOFTAC industrial courses "Best Practice for Engineering CFD", CWI Amsterdam 2013
- Osney Thermo-Fluids Laboratory, University of Oxford, April-May 2017
- Indian Institute of Technology, Gandhinagar, March 2018, India.

Teaching and student/researchers guidance:

Universities in Sarajevo, Banja Luka, Zenica (B&H), Zagreb (Croatia), Novi Sad (Serbia), Podgorica (CG), Erlangen (Ge), Michigan Tech. Univ. (USA), Delft Univ. of Technology (NL), Darmstadt University of Technology (Ge), Sapienza University of Rome, Italy, State University of Novosibirsk, Russia.

Undergraduate courses:, Fluid Mechanics, Thermodynamics, Gas Dynamics, Transport Phenomena, Thermal Turbomachinery

Graduate courses: Advanced courses in Fluid Dynamics, Gas Dynamics, Transport Phenomena, Turbulence and its Modeling and Simulation,

Theses/projects supervision: close to 40 Ph.D, around 70 M.Sc./Dipl.-Ing, and over 30 postdocs and research visitors.

Publications:

- Number of papers in the international peer-reviewed journals and periodicals ~260
- Number of papers in refereed books and refereed conference proceedings: ~300
- Books: (co-) authored 5 books, (co-) edited 17 volumes / monographs, conference proceedings published by Cambridge Univ. Press, Springer, Taylor & Francis, Hemisphere Publ. Corp., Begell House Publ., VSND (NL), ANUBiH, Svjetlost (BH), Šahinpasic (BH)

Bibliometric record/citations:

Web of Science: about 6700 citations (h=42), Scopus: 8300 (h=48), Google Scholar: 14.400 (h=57), and in a number of textbooks and monographs;

Patents:

Two patents on detonation wave technique for on-line deposit removal from gas-side surfaces in power steam boilers fired by fossil fuels (with I. Smajević) (Belgrade, Yugoslavia, 1989), cited in over 60 patent applications (most in the US and Russian Patents).

Consulting with a number of industries and institutions in Europe, the USA, Kazakhstan, Russia, Singapore.

Akademik KEMAL HANJALIĆ: Bibliografija Jan, 2023

Doktorska disertacija: *Two-dimensional asymmetric turbulent flow in ducts*, Imperial College of Science and Technology, University of London, UK, 1970.

Magistarski (MSc) rad: *Heat transfer in simulated nucleate boiling*, Graduate School of Thermodynamics, University of Birmingham, UK, 1966.

I. Knjige (Books)

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V. Radovi u zbornicima (Publications in refereed conference proceedings)

V.1. Plenarna i uvodna predavanja (plenary and keynote lectures)

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9. Hanjalić, K., 2018 Computational predictions of geophysical and environmental flows: LES, RANS and Hybrid modelling", plenary lecture, *Emerging Trends in Modelling Strategies for Natural*

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 11. Hanjalić, K., 2017, RANS turbulence modelling of unsteady flows: hidden potential, snares and relation to LES" (keynote lectures), *Proc. Science and Motor Vehicles – Automotive Engineering for Improved Safety, XXVI JUMV Intern. Automotive Conference, Beograd 19-20.4 2017*, 12 pages
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6. Hanjalić, K., 2006, Towards research and education excellence: Some experience from a European university of technology, *15th Science Conf. on High Education*, Ankara, 7-10 Novembar, 2006, Islamic World Academy of Sciences, 18 pages.
7. Hanjalić, K., 2005, *Reconciling the Irreconcilable*, Valedictory Address, Delft University of Technology, ISBN 90-9019710-9, 28 pages.
8. Hanjalić, K., Jones, W.P, Rodi, W., 2000, Professor Brian E. Launder on his 60th birthday, *Int. J. Heat and Fluid Flow*, **21**(1): V-VI.
9. Hanjalić, K., 1995, *Heat and Fluid Flow: Reality and Imitations*, Inaugural Lecture, Delft University of Technology, ISBN 90-9019710-9, 28 pages.
10. Hanjalić, K., 1988, Nauka i obrazovanje u funkciji tehnološkog razvoja u svijetu i kod nas, *Opredjerenja*, **1**, DES Sarajevo, YU ISSN 0351-126X: 26-53.

VII. Stručni radovi i projekti (Professional works and projects), selected

Veći broj elaborata i izvještaja o naučno-istraživačkim i razvojnim projektima (autor-koautor-urednik), finansiranih od strane nacionanih fondacija za naučni rad i industrije: BiH (SIZ za nauku), Italija, Nizozemska (FOM, STW), Njemačka (DFG, DAAD), SAD (EPA), Ruska Federacija, te projekti u okviru EU programa TEMPUS, INTAS, BRITE EURAM, JOULE, GROWTH, FP5, od kojih se navode najznačajniji:

1. Hanjalić, K. (koordinator/urednik), 1986-91, Razvoj i proizvodnja energetske, procesne i druge mašinske opreme visoke efikasnosti na bazi malootpadnih tehnologija sa novim vidovima konverzije energije, Društveni cilj VIII A, Mašinski fakultet u Sarajevu, (SIZ za nauku BiH uz učešće svih značajnijih preduzeća u BiH u oblasti projektovanja, proizvodnje i izgradnje energetskih i procesnih postrojenja i opreme – instituti i fabrike Energoinvesta, Unioninvest, UNIS, Famos, Elektroprivreda BiH i drugi).
2. Hanjalić, K. (koordinator/urednik), 1998-2002, Models for Vehicle Aerodynamics "MOVA", EU BRITE-EURAM III project; participants: Delft University of Technology (NI), University of Manchester Institute of Technology (UMIST), UK, Institute for Fluid Mechancs, LSTM – University of Erlangen (Germany), AVL-List GmbH, Graz Austria, Electricité de France (EDF) Chatou – Paris, PSA Peugeot Citroëen (DRIA/ SARA/PVMO/AERO), Paris, France.
3. Hanjalic, K. (koordinator/urednik segmenta projekta), 2002-2005, Minimisation of NOx Emissions, "MinNOx", EU Programme "Energy, Environment and Sustainable Development"- Key Action 6: "Economic and Efficient Energy for a Competitive Europe"; participants: AVL-List GmbH (Austria), Delft University of Technology (NI), University of Stuttgart (Germany), Chalmers University (Sweden), Kings College, London (UK), DaimlerChrysler AG (Germany), Ford Werke (Germany), AB Volvo (Sweden).

4. **Hanjalic, K.** (koordinator/urednik segmenta projekta), 2003-2005, Magnetic field dynamos – "MAGDYN", EU DG 12, participants: Institute of Physics of the University of Latvia, Delft University of Technology (NL), Forschungszentrum Rosendorff and Technische Universität Dresden (Germany), CNRS Grenoble (LEGI, CNRS+INPG + University J. Fourier (France),
5. **Hanjalic, K.** (koordinator segmenta projekta), 1996-1999, Study and modelling of near-wall turbulence in IC Engines, EU JOULE III Programme, participants: TU Delft (NL), LSTM University of Erlangen (Germany), Laboratoire de Mécanique des Fluides et d'Acoustique - LMFA, Ecole Centrale de Lyon, Renault S.A. (France),
6. **Hanjalic, K.** (koordinator segmenta projekta), 1992-1995, Thematic network on implementation of refined transition prediction methods for turbomachinery - "Trans-Perturb", participants: Cambridge University (UK), Delft University of Technology, LSTM – University of Erlangen (Germany), University of Thessalonike (Greece).

VIII. Patenti, Kompjuterski programi (Patents, Computer software)

1. Smajević, I., **Hanjalić, K.**, 1988, patent P1728/88, *Uređaj za pouzdano pogonsko čišćenje ogrijevnih površina termoenergetskih i drugih kotlova velike snage pomoću detonacionih talasa*, Jugoslovenski patentni zavod, Beograd, 1988. Method razvijen i testiran u laboratoriju Mašinskog fakulteta u Sarajevu 1983-1986, instaliran i u pogonu (sa manjim prekidima) na dva kotla snage po 300 MWth u TE Kakanj od 1987 godine do danas. Višestruko citiran u *US Patents*. Interes za ovu tehnologiju pokazali ALSTOM (Njemačka), Pratt & Whitney i Diamond Power (USA), Ansaldo (Italija), Elektroprivreda Tesalije i Makedonije u Grčkoj i drugi.
2. Smajević, I., **Hanjalić, K.**, 1988, patent P1756/88, *Uređaj za odnošenje naslaga detonacionim talasima sa unutrašnjih površina reaktora za visokopritisnu gasifikaciju uglja*, Jugoslovenski patentni zavod, Beograd, 1988 (dopuna i adaptacija gore navedenog postupka za primjenu u reaktorima za gasifikaciju uglja).
3. Stošić, N., **Hanjalić, K.**, 1988, "SCORPATH" program za kompjutersku simulaciju procesa u vijčanim kompresorima: User Manual. Mašinski fakultet u Sarajevu. Software razvijen prvobitno za Tvornicu kompresora Energoinvest – Trudbenik, Doboj. Preradjen i proširen 1993 na Univerzitetu u Erlangenu (Njemačka), komerijaliziran u firmi M.A.N., Oberhausen, Njemačka. Nakon dodanih dopuna i proširenja, koristi se i danas u Centru za razvoj kompresora City Univerziteta u Londonu, te u nekoliko proizvođača kompresora u svijetu.
4. Ničeno, B., **Hanjalić, K.**, 2002, "T-Rex" program za LES (Large-Eddy Simulation) (numeričku dinamiku fluida, Computational Fluid Dynamics, CFD), User Manual (vidi takodje II.2); istraživački otvoreni software, baziran na metodi konačnih volumena za nestruktuiranu numeričku mrežu.
5. Hadžiabdić, M., Ničeno, B., **Hanjalić, K.**, 2005, 2007, "T-Flows" program za numeričku dinamiku fluida: User Manual, Dept of Applied Mechanics and Aerospace, Sapienza University of Rome (Italija). Baziran na "T-Rex" programu, proširen, sa ugradjenim naprednim modelima za RANS (Reynolds-average Navier-Stokes) i LES (large-eddy) simulacije, koristi se za istraživačke potrebe na više univerziteta (Delft University of Technology (NL), Federal Institute of Technology (ETH), Zürich (CH), Imperial College, London, (UK), Sapienza University of Rome (It), University of Gävle / Linköping Institute of Technology, Linköping (Se), Beihang Univeristy, Beijing (China), i dr.

Rezime dostignuća i zasluga akad. Kemala Hanjalića u oblasti nauke i obrazovanja od značaja za Grad Sarajevo i BiH

1. Akademik Kemal Hanjalić spada među međunarodno najpriznatije naučnike u BiH, pa i regiji. Uvršten je i visoko rangiran (među prvih 25%) u SCOPUS listu 2% najcitiranijih autora u svijetu. Ima reputaciju jednog od pionira i vodećeg naučnog autoriteta u oblasti matematskog modeliranja i kompjuterske simulacije turbulencije i transportnih procesa.
2. Dostignuća u ovoj oblasti sumirani su u kapitalnoj knjizi 'Modelling turbulence in engineering and the environment', autori K. Hanjalić i B.E. Launder, Cambridge Univesity Press, 2011, drugo izdanje 2022. Knjiga je dobila veoma laskave prikaze (na primjer SIAM Review - Society for Applied and Industrial Mathematic, SAD), i široko je prihvaćena kako u akademskim zajednicama, tako i u industriji.
3. Bio je glavni urednik naučnog časopisa 'Flow, Turbulence and Combustion' (Springer) (2005-15) i član uređivačkih odbora više međunarodnih časopisa u oblasti Mehanike Fluida i Termodinamike.
4. Kao mentor vodio je oko 40 doktoranata i brojne magistrante i postdoktorante od kojih su danas 8 profesori na renomiranim univerzitetima u svijetu (3 u Sarajevu), a većina vodeći stručnjaci u industriji u EU i SAD.
5. Rukovodio je makro-projektom 'Društveni cilj 8A, Razvoj energetske opreme' (1987-91) u kojem je učestvovalo oko 30 istraživača iz nekoiko institucija. Posebno uspješna je bila aktivnost u kompjuterskim simulacijama turbulentnih strujanja transportnih procesa kao alata za optimiziranje realnih sistema. Brojni učesnici ovog projekta su postali uspješni i priznati naučnici i univerzitetski nastavnici (nažalost, danas raštrkani širom svijeta), po kojima je ova aktivnost postala poznata kao 'Sarajevska škola modeliranja turbulencije'.
6. Kao inicijator i voditelj projekata u Institutu ITEN-Energoinvest i Mašinskom fakultetu u Sarajevu dao je značajan doprinos razvoju novih uređaja i procesa u termotehnici i termoenergetici, posebno klipnih i zavojnih kompresora (sa N. Stošićem, realizirani u tvornici Trudbenik, Energoinvest), novog metoda gasifikacije uglja (sa M. Sijerčićem), pulzirajućih gorionika, te detonacionog otklanjanja naslaga u velikim ložistima (dva patenta, sa I. Smajevićem, višestruko citirani u U.S. Patents), koji je realiziran i bio u pogonu od 1987 -2011 na dva kotla u TE Kakanj.
7. Kao dekan, 1984. godine aktivirao je industrijski konzorcij za Mašinski fakultet u Sarajevu, te pokrenuo i vodio izgradnju nove zgrade, koja je dovršena 1989. godine. Nakon rata, pokrenuo je i sa Prof. F. Durst-om (Univ. Erlangen) vodio grant-projekat Njemačke vlade (2,1 mil KM) za obnovu ratom devastiranih laboratorija, istraživačke i pedagoške infrastrukture i aktivnosti na Maš. fakultetu u okviru kojeg je organizovano šest ljetnih škola (1997-2002) uz učešće oko 200 sudenata, pretežno sa UNSA.

Doprinosom nauci, te istraživačkim i edukativnim inovacijama, za koje je dobio brojna visoka priznanja (državna odlikovanja SFRJ, Finske i Nizozemske, naučne nagrade 'Max Plank' i 'Nusselt-Reynolds', izbor u tri eminentne inostrane akademije nauka, tri počasna doktorata i dr.), te brojnim društvenim i profesionalnim funkcijama u domaćim i međunarodnim institucijama i profesionalnim organizacijama, akademik Kemal Hanjalić je *ostavio trajni legat i značajno doprinio afirmaciji i ugledu Grada Sarajeva i BiH.*

Akademik Kemal Hanjalić
Kralja Tvrtka 4, 71000 Sarajevo
23.1.2023

SAGLASNOST

Potvrđujem da sam saglasan i da prihvatam prijedlog Akademije nauka i umjetnosti Bosne i Hercegovine (ANUBiH) da me kandiduje za Šestoprilsku nagradu Grada Sarajeva u 2023 godini.

Kemal Hanjalić, s.r

AKADEMIJA NAUKA I UMJETNOSTI BOSNE I HERCEGOVINE
SKUPŠTINA

Broj: 01-01-1-28-3/23

Sarajevo, 24. 1. 2023. godine

U skladu sa odredbama Zakona o Akademiji nauka i umjetnosti Bosne i Hercegovine i Statuta Akademije nauka i umjetnosti Bosne i Hercegovine, Skupština ANUBiH je na vanrednoj sjednici održanoj od 19.-23. 1.2023. godine donijela

ODLUKU

o prijedlogu kandidature za Šestoaprilsku nagradu Grada Sarajeva u 2023.godini;

I

U skladu sa inicijativom Odjeljenja tehničkih nauka ANUBiH Skupština ANUBiH donosi odluku kojom se predlaže kandidatura akademika Kemala Hanjalića za Šestoaprilsku nagradu Grada Sarajeva u 2023.godini.

II

Ova odluka stupa na snagu danom donošenja.

Obrazloženje

Dopisni član ANUBiH Izet Smajević dostavio je članovima Odjeljenja tehničkih nauka ANUBiH inicijativu za kandidiranje akademika Kemala Hanjalića za Šestoaprilsku nagradu Grada Sarajeva u 2023. godini. Naučni i stručni opus akademika Kemala Hanjalića je impresivan, kao i njegov društveni doprinos, posebno razvoju nauke i visokog obrazovanja u Sarajevu, Bosni i Hercegovini, i šire, te posjeduje sve reference za ovu nagradu u kategoriji 'Nauka i obrazovanje'.

Članovi Odjeljenja tehničkih nauka ANUBiH su usvojili inicijativu dopisnog člana Izeta Smajevića da se akademika Kemala Hanjalića kandidira za Šestoaprilsku nagradu Grada Sarajeva u 2023. godini te su isti uputili u dalju proceduru unutar ANUBiH.

Članovi Skupštine ANUBiH su na sjednici održanoj od 19. - 23. 1. 2023. godine razmatrali inicijativu Odjeljenja tehničkih nauka ANUBiH te je Skupština ANUBiH donijela Odluku kojom se predlaže kandidatura akademika Kemala Hanjalića za Šestoaprilsku nagradu Grada Sarajeva u 2023.godini.

Predsjednik ANUBiH

Akademik Muris Čičić, s.r.



ZAKON O AKADEMIJI NAUKA I UMJETNOSTI BOSNE I HERCEGOVINE

Član 1.

Akademija nauka i umjetnosti Bosne i Hercegovine (u daljem tekstu Akademija) je samostalna organizacija u koju su primljeni istaknuti naučni radnici i umjetnici u Republici Bosni i Hercegovini radi unapređivanja nauke i umjetnosti.

Član 2.

Akademija ima svojstvo pravnog lica. Sjedište Akademije je u Sarajevu.

Član 3.

Akademija svojom djelatnošću:

- razvija naučnu misao i njeguje umjetnosti,
- proučava i podstiče proučavanje značajnih pitanja u oblasti nauke i umjetnosti,
- organizuje i koordinira istraživanja u svim oblastima nauke i podstiče stvaralaštvo u oblasti umjetnosti,
- doprinosi utvrđivanju i ostvarivanju politike razvoja nauke i kulture,
- podstiče i pomaže uzdizanje naučnih radnika i umjetnika,
- sudjeluje u vrednovanju rezultata naučnog i umjetničkog rada,
- daje prijedloge i mišljenja državnim organima o unapređivanju nauke, organizaciji naučnog rada i primjeni naučnih tekovina, kao i o mjerama za unapređivanje umjetnosti,
- objavljuje rezultate naučnih istraživanja i naučna i umjetnička djela koja su od posebnog značaja za Republiku i njenu kulturnu baštinu.

Član 4.

Radi ostvarivanja svojih zadataka Akademija saraduje sa drugim akademijama nauka i umjetnosti, visokoškolskim organizacijama i njihovim zajednicama, naučnim, kulturnim i drugim organizacijama i zajednicama, naučnim radnicima i umjetnicima u zemlji i inostranstvu.

Član 5.

Rad Akademije je javan. Način obezbjeđivanja javnosti utvrđuje se Statutom Akademije.

Član 6.

Sredstva za rad, na osnovu plana i programa rada i razvoja Akademije, obezbjeđuju se u Budžetu Republike Bosne i Hercegovine i iz drugih prihoda.

Član 7.

Nadzor nad zakonitošću rada Akademije vrši Ministarstvo za obrazovanje, nauku, kulturu i sport Republike Bosne i Hercegovine.

Član 8.

Akademija ima redovne (akademike) i dopisne članove, a može imati i počasne članove (domaće i inostrane).

Član 9.

Za redovnog člana Akademije bira se istaknuti naučni radnik, odnosno umjetnik, državljanin Republike Bosne i Hercegovine koji ima prebivalište i djeluje na teritoriji Republike, čiji rezultati u oblasti nauke, odnosno umjetnosti predstavljaju visoko dostignuće i uživaju opšte priznanje.

Za dopisnog člana Akademije bira se naučni radnik, odnosno umjetnik, državljanin Republike Bosne i Hercegovine koji ima prebivalište i djeluje na teritoriji Republike, a koji se ističe značajnim naučnim, odnosno umjetničkim rezultatima.

Član 10.

Za počasnog člana može biti izabrano lice koje ima osobite zasluge za izgradnju i razvitak Republike Bosne i Hercegovine, ili za učešće i unapređenje mira u svijetu i međunarodnu saradnju, ili lice koje

je dalo naučna, odnosno umjetnička ostvarenja izuzetno velikog značaja.
Počasni član ima prava redovnog člana.

Član 11.

Za člana Akademije može se birati naučni radnik, odnosno umjetnik, državljanin Republike Bosne i Hercegovine sa prebivalištem izvan teritorije Republike, čiji su rezultati u oblasti nauke, odnosno umjetnosti posebno društveno priznati.
Za člana Akademije može se birati i strani državljanin, naročito istaknuti naučnik, odnosno umjetnik koji saraduje sa Akademijom ili je na drugi način zaslužan za razvitak nauke i umjetnosti u zemlji.

Član 12.

Izbor novih članova Akademije vrši se, po pravilu, svake druge godine.

Član 13.

Redovni i dopisni članovi Akademije koji se stalno nastane izvan teritorije Republike ostaju članovi Akademije (Član 11. ovog zakona).

Član 14.

Prijedlog za izbor redovnih članova Akademije mogu davati: odjeljenje ili druga naučna jedinica Akademije, dva člana Akademije, univerzitet, visokoškolska organizacija, organizacija koja se bavi naučnim radom, naučnoistraživačka organizacija i udruženje građana u oblasti umjetnosti.

Izbor počasnih članova predlaže organ određen statutom Akademije.

Izbor članova (domaćih i inostranih) predlaže odgovarajuće odjeljenje Akademije.

Bliže odredbe o predlaganju i načinu izbora članova Akademije sadrži Statut Akademije.

Član 15.

Članstvo u Akademiji je doživotno, a može prestati ostavkom ili odlukom Skupštine Akademije.

Član 16.

~~Skupština je najviši organ upravljanja Akademije.
Skupština sačinjavaju redovni i dopisni članovi.~~

Član 17.

Određene izvršne funkcije Skupština može povjeriti svom izvršnom organu – Predsjedništvu, koji odgovara za svoj rad.

Sastav, ovlašćenja, djelokrug i način rada predsjedništva utvrđuje se Statutom Akademije.

Član 18.

Za obavljanje naučnih, stručnih, finansijskih i upravnih poslova Akademija obrazuje naučnu i stručnu službu.

Odnosi između naučne i stručne službe i Akademije regulišu se ugovorom.

Član 19.

Radnici radne, naučne i stručne službe imaju pravo na sredstva za ličnu i zajedničku potrošnju u skladu sa načelom raspodjele prema radu. Međusobna prava i obaveze koja proističu iz radnog odnosa radnici stručne i naučne službe utvrđuju opštim aktima, u skladu sa zakonom.

Član 20.

Skupština Republike Bosne i Hercegovine daje saglasnost na Statut Akademije.

Član 21.

Dosadašnji dopisni članovi Akademije koji imaju prebivalište izvan teritorije Republike postaju članovi Akademije.

Redovni članovi Akademije čije se prebivalište nalazi izvan teritorije Republike zadržavaju naziv akademika.

Član 22.

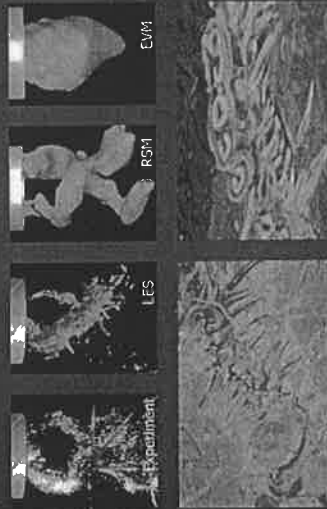
Danom supanja na snagu ovog zakona prestaje da važi Zakon o Akademiji nauka i umjetnosti Bosne i Hercegovine („Službeni list SR BiH, br. 22/66 i 4/72).



Kemal Hanjalić and Brian Launder

Modelling Turbulence in Engineering and the Environment

Rational Alternative Routes to Closure



Second Edition

Hanjalić and Launder
Modelling Turbulence in Engineering and the Environment

Second Edition

Modelling transport and mixing by turbulence in complex flows are huge challenges for computational fluid dynamics (CFD). This highly readable book introduces readers to modelling levels that respect the physical complexity of turbulent flows. It examines the hierarchy of Reynolds-averaged Navier-Stokes (RANS) closures in various situations ranging from fundamental flows to three-dimensional industrial and environmental applications. The general second-moment closure is simplified to linear eddy-viscosity models, demonstrating how to assess the applicability of simpler schemes and the conditions under which they give satisfactory predictions.

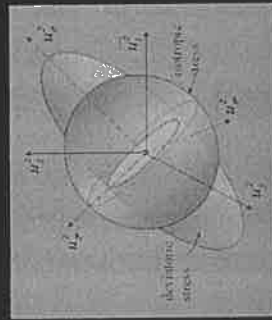
The principal changes for the second edition reflect the impact of computing power: a new chapter devoted to unsteady RANS and another on how large-eddy simulation, LES, and RANS strategies can be effectively combined for particular applications.

This book will remain the standard for those in industry and academia seeking expert guidance on the modelling options available, and for graduate students in physics, applied mathematics and engineering entering the world of turbulent flow CFD.

Praise for the first edition

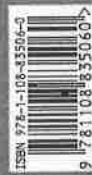
'The authors have been top researchers in the field for over 40 years, and have collaborated many times, so their writing is seamless. Their passion, maturity, clarity, honesty and intellectual honesty are impressive in a field which has had its fair share of wild claims or simply near-delusions. This is a permanent, detailed, authoritative and inspiring reference in a field of engineering science which will be very challenging, active and important for years to come.'

PHILIPPE STALLMET *Experiments with the Boeing Company*
SIAM Review, Vol. 53, p614, Dec 2012



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