



UNIVERSITY OF PRETORIA

Revision date: 23 May 2022

1. BIOGRAPHICAL SKETCH

1.1 GENERAL INFORMATION									
Surname	Dirker								
First names	Jaco			ID Number					
Citizenship	South Africa			Title	Prof	Female		Male	X
Place of birth	Johannesburg			Date of birth			17 May 1977		
Population group	African		Coloured		Indian		White	X	Other <i>(Please specify)</i>
Department	Mechanical and Aeronautical Engineering			Position			Associate Professor		
Direct Telephone	012 420 2465			Direct Telefax			012 420 2047		
E-mail	jaco.dirker@up.ac.za								
Date of appointment	July 2004			Permanent full-time			X	Temporary full-time	

1.2 ACADEMIC QUALIFICATIONS OBTAINED				
Degree/ Diploma	Field of study	Higher education institution	Year	Distinctions
D.Eng	Mechanical	Rand Afrikaans University	2004	
M.Eng	Mechanical	Rand Afrikaans University	2002	Cum Laude
B.Sc.	Mathematics and Applied Mathematics	Rand Afrikaans University	2002	Cum Laude
B.Eng	Mechanical	Rand Afrikaans University	2000	Cum Laude

1.3 WORK EXPERIENCE TO DATE		
Name of employer	Capacity and/or type of work	Period From (mm//yy to mm//yy)
Department of Mechanical and Aeronautical Engineering, University of Pretoria	Associate Professor	January 2016 - present
Department of Mechanical and Aeronautical Engineering, University of Pretoria	Senior Lecturer	January 2007 – December 2015
Department of Mechanical and Aeronautical Engineering, University of Pretoria	Lecturer ,	July 2004 – December 2006
Department of Mechanical Engineering, Rand Afrikaans University	Junior Lecturer	2001-2003

2. TEACHING ACTIVITIES

2.1 Courses presented		
Course	Level (e.g. second year, Masters)	Self developed (Yes or No)
Engineering Drawing MIT133 / Graphical Communication MGC110	first year	No
Machine Design MOW122	first year	No
Machine Design MOW222	second year	No
Machine Design MOW216	second year	No
Theory of Machines MSK222	second year	No
Thermodynamics MTX221	second year	No
Systems and Design MOW732	Honors degree	No
Air Conditioning and Refrigeration MLR780	Honors degree	Yes

2.2 Other education and pedagogic courses presented		
Course	Year	Institution

3. TEACHING OUTPUTS

3.1 Educational publications and products
<ul style="list-style-type: none"> • None at present

4. OTHER TEACHING CONTRIBUTIONS

4.1 Membership of national and international bodies

- None at present

4.2 Visits to local and overseas universities as guest professor or lecturer in regard to teaching

- None at present

4.3 Participation in national and international teaching associations, bodies, committees

- None at present

5. POSTGRADUATE SUPERVISION

5.1 Supervision or co-supervision of students who have completed degrees

Name of student	Degree/Title of dissertation/ thesis and date completed (All full research)	Supervisor	Co-supervisor(s)	Duration of studies (years)
Dickson Ndenguma	M.Sc (Applied Science) Optimized mine ventilation in a blind tunnel. (2010)	J. Dirker	N.D.L. Burger	2
Warren van Zyl	M.Eng (Mech) Macro-scale annular heat transfer and Pressure drop (2013)	J. Dirker	J.P. Meyer	1.5
Darshik Garach	M.Eng (Mech) Heat transfer and pressure drop in microchannels with different inlet geometries for laminar and transitional flow of water (2013)	J. Dirker	J.P. Meyer	4
Francois Hector Burger	M. Eng (Mech) Three-dimensional conductive heat spreading layouts obtained using topology optimisation for passive internal electronic cooling (2013)	J.Dirker	J.P. Meyer	1.5
Jacq Crous	M.Eng (Mech) The influence of a coupled formulation on the fluid dynamics in a large scale journal bearing. (2014)	P.S. Heyns	J. Dirker	2
Japie van der Westhuizen	M.Eng (Mech) Heat transfer coefficients at the inlet regions of heat exchangers (2014)	J. Dirker	J.P. Meyer	2
Marc Greenland	M.Eng (Mech) Conjugate three-dimensional analysis of heat transfer in a minichannel with changing geometrical constraints. (2015)	J. Dirker	J.P. Meyer	6
Muteba Kandindi	M.Sc. (Applied Science) Heat transfer and pressure drop investigation for prescribed heat fluxes on both the inner and outer wall of an annular duct (2016)	J. Dirker	J.P. Meyer	4.5
Francois Prinsloo	M.Eng (Mech) Investigation of turbulent heat transfer and pressure drop characteristics in the annuli of tube-in-tube heat exchangers (horizontal lay-out) (2016)	J. Dirker	J.P. Meyer	4
Berno Kohlmeyer	M.Eng (Mech) Development of an improved design correlation for local heat transfer coefficients at the inlet regions of annular flow passages / Local heat	J. Dirker	J.P. Meyer	1

	transfer coefficients and wall temperature measurements for solar driven systems. (2016)			
Waldo Bornman	Ph.D. Energy optimisation for mine cooling systems through flow control (2017)	J. Dirker	J.P. Meyer, D. Arndt	3
Francis Okafor	PhD (Mechanics), Influence of Circumferential Spans of Heat Flux Distributions on Secondary Flow, Heat Transfer and Friction Factors for a Linear Focusing Solar Collector Type Absorber Tube (2017)	J. Dirker	J.P. Meyer	5
Wesley Reid	M.Eng (Mech), Experimental Investigation of Circumferentially Non-Uniform Heat Flux on the Heat Transfer Coefficient in a Smooth Horizontal Tube with Buoyancy Driven Secondary Flow (2017)	J. Dirker	J.P. Meyer	4
Dickson Ndenguma	PhD (Mechanics), Heat Transfer and Pressure Drop in Annuli with Non-Uniform Internal Wall Temperatures in the Transitional Flow Regime (2017)	J. Dirker	J.P. Meyer	3.5
Tichaona Kumirai	M.Sc (Applied Science), Development of a design tool for phase change thermal energy storage for free comfort cooling in South Africa (2018)	J. Dirker	J.P. Meyer	4
Rowan M. Steyn	M.Eng (Mech), Local heat transfer coefficients in an annular passage with flow turbulation	J. Dirker	J.P. Meyer	3.5
Marius Vermaak	M.Eng (Mech), Flow boiling in microchannels at different rotation and inclination orientations (2020)	J. Dirker	J.P. Meyer	1.5
Hannalie Scheepers	M.Eng (Mech), Experimental investigation of the impact of non-uniform heat flux on boiling in a horizontal circular test section (2021)	J. Dirker	J.P. Meyer	1
Johann Möller	M.Eng (Mech), Numerical Optimization of a Finned Cavity Latent Thermal Energy Storage Enclosure for Solar Power Production (2022)	J. Dirker	J.P. Meyer	4
Johann van den Bergh	Ph.D., Experimental investigation into the influence of low mass and heat fluxes and transient perturbations in vapour quality and heat flux on the behavior of boiling R245fa in horizontal pipes.	J. Dirker	J.P. Meyer, C. N. Markides	4.5

5.2 Current post-graduate students					
Name of student	Degree enrolled for and date of first registration (All full research)	Project title	Supervisor	Co-supervisor	Year of registration
Mandi Venter	M.Eng (Mech), 2022	Flow boiling stability in microchannels at different inclinations	J. Dirker	J.P. Meyer	2022
Marius Vermaak	PhD, 2021	Flow boiling in microchannels at different rotation and	J. Dirker		2021

		inclination orientations			
Justin Templeton	M.Eng, 2021	Development of a Periodic Continuous Combustion Chamber using Pre-Compressed Air and Hydrogen	J.Dirker	J. Huysen	2021
Tanya Weiswange	M.Eng, 2021	Latent thermal energy storage in a plat flat configuration	J.Dirker		2021
Andrew Martin	M.Eng, 2022	Flow visualization and heat transfer characteristics during flow boiling with non-uniform heat flux.	J.Dirker	J.P. Meyer	2022
Bothabo Ngwenya	M.Eng, 2022	Thermal energy storage using concrete for direct steam generation systems.	J.Dirker		2022
Arje Linström	M.Eng, 2022	Comfort cooling of a room with PCM plates at the ceiling or in the plenum space.	J.Dirker		2022
Tshiamo Segakweng	PhD (Mechanics), 2022	Adsorptive drying using Metal-Organic Frameworks	J. Dirker	CSIR	2022
Tshiamo Kefithile Hlabyago	M.Eng, 2022	Influence of Vehicle Cabin Thermal Conditions on Short-Drive Cooling Demand and Passenger Comfort	D. van Vuuren	J.Dirker	2022

5.3 Post-Doctoral Supervision and Co-Supervision				
Name of Fellow	Project title	Supervisor	Co-supervisor	Year
Dr. Adekunle Adelaja.	Experimental investigation of diabatic two-phase flows	J. Dirker	J.P. Meyer	2012 - 2014

6. RESEARCH FUNDING

6.1 Obtaining research funds (Optional)				
Origin of research funds <i>(e.g. contract research, THRIP, international funding organisations, other(s))</i>	Title of research project or programme	Duration	Money allocated (R) (Optional - exact amounts not required)	
Royal Society (United Kingdom) – as part of an international consortium	Harnessing unsteady phase-change heat exchange in high-performance concentrated solar power systems	2016-2020	R 9 million	
NRF Incentive Funding	Unspecified	2015-2019		
NRF Incentive Funding	Unspecified	2010-2014		

NRF	Embedded Cooling of Electronics	2008-2009	
UP (Glue Funding)	Unspecified	2009	

7. RESEARCH OUTPUTS

7.1 Publications in peer-reviewed or refereed journals

- 1) Dirker J, Scheepers H, Meyer JP, "The effect of circumferentially non-uniform heat flux on flow boiling heat transfer in a horizontal tube", International Journal of Heat and Mass Transfer, Vol. 185,122428, 2022
- 2) Van den Bergh WJ, Dirker J, Markides CN, Meyer JP, "Influence of non-steady transient heat flux on flow boiling heat transfer and pressure drop in horizontal pipes", International Journal of Heat and Mass Transfer, Vol. 182,121927, 2022
- 3) Sunden B, Meyer JP, Dirker J, John B, Mukkamala Y, "Local Measurements in Heat Exchangers: A Systematic Review and Regression Analysis", Heat Transfer Engineering, **Article in Press.**
- 4) Adelaja AO, Dirker J, Meyer JP, "Experimental study of entropy generation during condensation in inclined enhanced tubes", International Journal of Multiphase Flow, Vol.145,103841,2021
- 5) Van den Bergh WJ, Moran HR, Dirker J, Markides CN, Meyer JP, "Effect of low heat and mass fluxes on the boiling heat transfer coefficient of R-245fa", International Journal of Heat and Mass Transfer, Vol.180,121743, 2021
- 6) Dirker J, Meyer JP, Steyn RM, "Influence of ring type flow turbulators on the local heat transfer coefficients in an annular passage – An experimental and numerical investigation", International Journal of Thermal Sciences, Vol. 168,107052, 2021
- 7) Moran HR., Zogg D, Voulgaropoulos V, van den Bergh WJ, Dirker J, Meyer JP, Matar OK, Markides CN, "An experimental study of the thermohydraulic characteristics of flow boiling in horizontal pipes: Linking spatiotemporally resolved and integral measurements", Applied Thermal Engineering, Vol 194, 117085, 2021
- 8) Dirker, J, van den Bergh WJ, Moran HR, Markides CN, Meyer JP, "Influence of inlet vapour quality perturbations on the transient response of flow-boiling heat transfer", International Journal of Heat and Mass Transfer, Vol. 170,121017, 2021
- 9) Adelaja AO, Ewim DRE, Dirker J, Meyer JP, "An improved heat transfer correlation for condensation inside inclined smooth tubes", International Communications in Heat and Mass Transfer, Vol. 117, Article number 104746, 2020
- 10) Vermaak M, Potgieter J, Dirker J, Moghimi MA, Valluri P, Sefiane K, Meyer JP, "Experimental and Numerical Investigation of Micro/Mini Channel Flow-Boiling Heat Transfer with Non-Uniform Circumferential Heat Fluxes at Different Rotational Orientations", International Journal of Heat and Mass Transfer, Vol. 158, Article number 119948, 2020
- 11) Adelaja AO, Ewim DRE, Dirker J, Meyer JP, "Heat transfer, void fraction and pressure drop during condensation inside inclined smooth and microfin tubes", Experimental Thermal and Fluid Science, Vol. 109, Article number 109905, 2019
- 12) Dirker J, Juggurnath, D, Kaya A, Oswade EA, Simpson M, Lecompte S, Noori Rahim Abadi SM, Voulgaropoulos V, Adelaja AO, Dauhoo MZ, Khoodaruth A, Obayopo SO, Olakoyejo OT, Elahee MK, De Paepe M, Meyer, JP, Markides CN, "Thermal energy processes in direct steam generation solar systems: Boiling, condensation and energy storage", Frontiers in Energy Research, Vol. 6, Article number 147, 2019
- 13) Adelaja AO, Dirker J, Meyer JP, "Condensation heat transfer coefficients and enhancements of R134a in smooth and microfin inclined tubes", Energy Procedia, Vol 158, pp. 5299-5304, 2019
- 14) Kumirai T, Dirker J, Meyer JP, " Experimental analysis for thermal storage performance of three types of plate encapsulated phase change materials in air heat exchangers for ventilation applications", Journal of Building Engineering, Vol. 22, pp. 75-89, 2019
- 15) Okafor IF, Dirker J, Meyer, JP, " Asymmetrical Non-Uniform Heat Flux Distributions For

- Laminar Flow Heat Transfer With Mixed Convection In a Horizontal Circular Tube”, Heat Transfer Engineering, Vol. 40, pp. 109-127, 2019
- 16) Dirker, J, Meyer, JP, Reid, WJ, “Experimental investigation of circumferentially non-uniform heat flux on the heat transfer coefficient in a smooth horizontal tube with buoyancy driven secondary flow”, Experimental Thermal and Fluid Science, Vol. 98, pp. 480-496, 2018
 - 17) Noori Rahim Abadi SMA, Meyer JP, Dirker J, “Effect of saturation temperature on the condensation of R134a inside an inclined smooth tube”, International Journal of Refrigeration, Vol. 94, pp. 186-204, 2018
 - 18) Noori Rahim Abadi SMA, Meyer JP, Dirker J, “Numerical simulation of condensation inside an inclined smooth tube”, Chemical Engineering Science, Vol. 82, pp. 132-145, 2018
 - 19) Prinsloo FPA, Dirker J, Meyer JP, “Heat transfer direction dependence of heat transfer coefficients in annuli”, Heat and Mass Transfer, Vol. 54(4), pp. 1145-1161, 2018
 - 20) Noori Rahim Abadi SMA, Meyer JP, Dirker J, “Effect of inclination angle on the condensation of R134a inside an inclined smooth tube”, Chemical Engineering Research and Design, Vol. 132, pp. 346-357, 2018
 - 21) Okafor IF, Dirker J, Meyer, JP, “Influence of non-uniform heat flux distributions on the secondary flow, convective heat transfer and friction factors for a parabolic trough solar collector type absorber tube, Renewable Energy”, Vol. 108, pp 287-302, 2017
 - 22) Bornman W, Dirker J, Arndt DC, and Meyer JP, “Integrated Energy Simulation of a Deep Level Mine Cooling System Through a Combination of Forward and First-Principle Models Applied to System-Side Parameters”, Applied Thermal Engineering, Vol. 123, pp 1166-1180, 2017
 - 23) Ndenguma DD, Dirker J, Meyer JP, “Heat Transfer and Pressure Drop in Annuli with Approximately Uniform Internal Wall Temperatures in the Transitional Flow Regime”, International Journal of Heat and Mass Transfer, Vol 111, pp 429-441, 2017
 - 24) Dirker J, Meyer JP, Kohlmeyer BW, “Local heat transfer coefficients at the inlet of an annular flow passage”, International Journal of Heat and Mass Transfer, Vol 113, pp 268-280, 2017
 - 25) Ndenguma DD, Dirker J, Meyer JP, “Transitional flow regime heat transfer and pressure drop in an annulus with non-uniform wall temperatures”, International Journal of Heat and Mass Transfer, Vol 108, pp. 2239-2252, 2017
 - 26) Adelaja AO, Dirker J, Meyer JP, “Experimental study of the pressure drop during condensation in an inclined smooth tube at different saturation temperatures”, International Journal of Heat and Mass Transfer, Vol 105, pp. 237-251, 2017
 - 27) Bornman W, Dirker J, Arndt DC, Meyer JP, “Operational energy minimisation for forced draft, direct-contact bulk air cooling tower through a combination of forward and first-principle modelling, coupled with an optimisation platform”, Energy, Vol 114, pp 995-1006, 2016.
 - 28) Adelaja AO, Dirker J, Meyer JP, “Convective condensation heat transfer of R134a in tubes at different inclination angles”, International Journal of Green Energy, Vol 13, pp 812-821, 2016
 - 29) Page LG, Dirker J, Meyer JP, “Topology optimization for the conduction cooling of a heat-generating volume with orthotropic material”, International Journal of Heat and Mass Transfer, Vol 103, pp 1075-1083, 2016
 - 30) Van der Westhuizen JE, Dirker J and Meyer JP, “Implementation of liquid crystal thermography to determine wall temperatures and heat transfer coefficients in a tube-in-tube heat exchanger”, Experimental Heat Transfer, Vol 29 (5), pp. 632-656, 2016
 - 31) Crous JM, Heyns PS, Dirker J, “On the influence of a coupled and uncoupled formulation on the fluid dynamics in a large scale journal bearing”. Applied Mathematical Modelling, Vol 40, pp. 1218 – 1231, 2016
 - 32) Dirker J, Meyer JP and Garach, “Inlet flow effects in micro-channels in the laminar and transitional regimes on single-phase heat transfer coefficients and friction factors”, International Journal of Heat and Mass Transfer, Vol. 77, pp. 612 – 626, 2014.
 - 33) Okafor IF, Dirker J, Meyer, JP, “Influence of circumferential solar heat flux distribution on the heat transfer coefficients of linear fresnel collector absorber tubes”, Solar Energy, Vol. 107, pp. 381 – 397, 2014.
 - 34) Ndenguma DD, Dirker J and Burger NDL., “Computational fluid dynamics model for investigating flow patterns in underground coalmines sections”, The Southern African Institute of Mining and Metallurgy Journal Vol. 114 (6), pp. 419 – 425. 2014.
 - 35) Adelaja AO, Dirker J and Meyer JP, “Effects of the thick walled pipes with convective boundaries on laminar flow heat transfer”, Applied Energy, Vol. 130, pp. 838 – 845, 2014.
 - 36) Meyer JP, Dirker J and Adelaja AO, “Condensation heat transfer in smooth inclined tubes for

- R134a at different saturation temperatures”, International Journal of Heat and Mass Transfer, Vol. 70, pp. 515 – 525, 2014.
- 37) Burger, HF, Dirker J and Meyer JP; “Three-dimensional conductive heat transfer topology optimisation in a cubic domain for the volume-to-surface problem”, International Journal of Heat and Mass Transfer, Vol. 67, pp. 214 – 224, 2013.
 - 38) Van Zyl WR, Dirker J and Meyer JP; “Single-phase convective heat transfer and pressure drop coefficients in concentric annuli”, Heat Transfer Engineering, Vol. 24, No. 13, pp. 1112 - 1123, 2013.
 - 39) Dirker J and Meyer JP; “Topology optimization for an internal heat-conduction cooling scheme in a square domain for high heat flux applications”, Journal of Heat Transfer, Vol. 135, No. 11, Paper number 111010, 2013.
 - 40) Bello-Ochende T, Meyer JP, and Dirker J, “Three-dimensional multi-scale plate assembly for maximum heat transfer rate density”, International Journal of Heat and Mass Transfer, Vol 53, No. 4, pp. 586 – 593, 2010\
 - 41) Dirker J and Meyer JP; “Thermal characterisation of embedded cooling layers in rectangular heat-generating electronic modules”, International Journal for Heat and Mass Transfer, Vol 52, No. 5-6, pp. 1374 – 1384, 2009
 - 42) Dirker J and Meyer JP; “Heat removal from power electronics in two direction sets using embedded solid state cooling layers – A proposed non-numerical calculation method”, Journal for Heat Transfer Engineering, Vol 30, No. 6. pp 452-465, 2009
 - 43) LIU W, Dirker J and Van Wyk JD, “Power density improvement in integrated electromagnetic passive modules with embedded heat extractors”, IEEE Transactions on Power Electronics, Vol 23, pp. 3142- 3150, 2008
 - 44) Dirker J and Meyer JP, “Cooling layers in rectangular heat generating electronic regions for two boundary conditions types – A comparison with a traditional approach” South African Journal of Science, 2007
 - 45) Dirker J, Malan, AG and Meyer JP, “Thermal characterisation of rectangular cooling shapes in solids”, International Journal of Numerical Methods for Heat Fluid and Flow, Vol. 17, pp. 361-383, 2007
 - 46) Dirker J, Van Wyk JD and Meyer JP, “Cooling of power electronics by embedded solids”, ASME Journal for Electronic Packaging, Vol. 128. pp. 388-397, 2006
 - 47) Dirker J, Malan, AG and Meyer JP, “Thermal characterization of rectangular cooling shapes in heat generating mediums – A three-dimensional investigation”, Strojnicki Vestnik- Journal of Mechanical Engineering, Vol. 51, No. 7 – 8, pp. 391-398, 2005
 - 48) Dirker J, Liu, W, Van Wyk JD, Meyer JP and MALAN AG; “Embedded solid state heat extraction in integrated power electronic modules”; I.E.E.E. Transactions on Power Electronics, Vol. 20, No. 3, pp. 694 – 703, May 2005.
 - 49) Dirker J and Meyer JP, “Convective heat transfer coefficients in concentric annuli”, Heat Transfer Engineering, Vol. 26, No. 2, pp. 38 – 44, 2005
 - 50) Dirker J, Van der Vyver H and Meyer JP; “Convection heat transfer in concentric annuli”, Experimental Heat Transfer; Vol. 17, pp. 19-29, 2004
 - 51) Dirker J and Meyer JP, "Convection in concentric annular regions for turbulent flow of liquid water", R & D Journal, Vol. 19, No. 2, pp. 17 - 21, 2003.
 - 52) Dirker J and Meyer JP, "Heat transfer coefficients in concentric annuli", Journal of Heat Transfer, Vol. 124, No. 6, pp. 1200 - 1202, 2002.

Accepted for publication:

- GREENLAND MR, DIRKER J, MEYER JP, “Analysis of Heat Transfer in Microchannels for Different Aspects Ratios with Negligible Axial Conduction” Submitted to Heat Transfer Engineering on 10/3/2016, Manuscript: HTE 1716
- KANDINDI M, DIRKER K, MEYER JP, “Heat transfer and pressure drop investigation for prescribed heat fluxes on both the inner and outer wall of an annular duct”, Submitted to Experimental Heat Transfer on 6/2/2017, Manuscript: UEHT-2017-0017

7.2 Books and/or chapters in books

- 1) JP Meyer, J Dirker and SMA Noori Rahim Abadi, “Chapter 6: A Review of Condensation in Inclined Tubes”, Encyclopedia of Two-Phase Heat Transfer and Flow III (Vol. 2), 2018

7.3 Published full-length conference papers/keynote addresses

- 1) Möller J, Dirker J, Meyer JP, "Optimisation of a Finned Cavity Latent Thermal Energy Storage Enclosure", 15th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2021, Paper 326, Virtual/ Online, 26 – 28 July 2021
- 2) Scheepers H, Dirker J, Meyer JP, "Influence of Heat Flux Distribution on Flow Boiling Heat Transfer in a Horizontal Tube", 15th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2021, Paper 325, Virtual/ Online, 26 – 28 July 2021
- 3) Vermaak M, Dirker J, Sefiane K, Meyer JP, "Experimental Investigation of Surface Temperature Changes due to Flow Instability in a Micro/Mini Channel During Flow-Boiling Heat Transfer with Non-Uniform Circumferential Heat Fluxes at Different Inclinations", 73rd Annual Meeting of the American Physics Society, Division of Fluid Dynamics, Virtual, Abstract number: T15.00007, 22 – 24 November 2020
- 4) Vermaak M, Dirker J, Sefiane K, Meyer JP, "The effect of gravity on flow boiling in non-uniformly heated microchannels at various orientations", IUTAM Symposium 2019, Dublin Ireland, 10 – 12 June 2019.
- 5) Van Den Bergh WJ, Meyer JP, Dirker J, Markides C, "Preliminary Investigation into the Effect of Step Changes in Boiling Heat Flux on R134a in a Horizontal Macro Tube", 14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2019, Wicklow, Ireland, 22 – 24 July 2019
- 6) Noori Rahim Abadi SMA, Meyer JP, Dirker J, "Numerical Investigation of Condensation Inside an Inclined Smooth Tube", 13th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2017, Portoroz, Slovenia, Paper Number: 1570360106, 17 – 19 July 2017
- 7) Bornman W, Dirker J, Arndt DC and Meyer JP, "Bulk Air Cooler Energy Optimisation through Simulation Coupled with an Optimisation Platform", 10th South African Conference on Computational and Applied Mechanics, SACAM 2016, Paper Number 63, Potchefstroom, South Africa, 3 – 5 October 2016.
- 8) Adelaja AO, Dirker J, and Meyer JP, "A Condensation Heat Transfer Correlation for Inclined Smooth Tubes", 12th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2016, Costa del Sol, Spain, Paper Number: 1570249348, 11 – 13 July 2016
- 9) Ndenguma, DD, Dirker J, and Meyer JP, "Transitional Flow Regime Heat Transfer in a Horizontal Annular Passage Associated with Mixed Convection and Non-uniform Wall Temperature Boundary Condition", 12th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2016, Costa del Sol, Spain, Paper Number: 1570248845, 11 – 13 July 2016
- 10) Okafor IF, Dirker J, and Meyer JP, "Turbulent Mixed Convection Heat Transfer for Non-uniform Heat Flux Distributions on a Horizontal Circular Tube", 12th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2016, Costa del Sol, Spain, Paper Number: 1570246462, 11 – 13 July 2016
- 11) Reid W, Dirker J, and Meyer JP, "Experimental Investigation Into the Effect of Circumferential Non-Uniform Heat Flux on a Circular Tube in the Laminar Flow Regime", 12th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2016, Costa del Sol, Spain, Paper Number: 1570249348, 11 – 13 July 2016
- 12) Dbouk T, Harion J, and Dirker J, "Topology Optimization of 2D and 3D Heat Conduction Structures", 5th International Conference on Engineering Optimization, Iguassu Falls, Brazil, 19 – 23 June 2016
- 13) Adelaja AO, Dirker J, and Meyer JP, "Experimental Investigation of Frictional Pressure Drop in Inclined Tubes", 11th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2015, Kruger National Park, South Africa, Paper Number 1570086465, 20 – 23 July 2015.
- 14) Adelaja AO, Dirker J, and Meyer JP, "Experimental Studies of Heat Transfer Coefficients and Pressure Drop in Inclined Condensing Units", 11th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2015, Kruger National Park, South Africa, Paper Number 1570086457, 20 – 23 July 2015.
- 15) Ndenguma DD, Dirker J, and Meyer JP, "Heat Transfer and Pressure Drop Characteristics of a Horizontal Annular Passage in the Transitional Flow Regime", 11th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2015, Kruger National Park, South Africa, Paper Number 1570073907, 20 – 23 July 2015.

- 16) Okafor FI, Dirker J, and Meyer JP, "Laminar Flow Heat Transfer for Asymmetrical Non-uniform heat flux distributions on Horizontal Circular Tubes" SASEC 2015, Third Southern African Solar Energy Conference, Kruger National Park, South Africa, Paper Number 1570017495, 11 – 13 May 2015.
- 17) Garach D, Dirker J, and Meyer JP, "Inlet Flow Effects in Microchannels on Single-Phase Heat Transfer Coefficients and Friction Factors", 15th International Heat Transfer Conference, IHTC 2014, Kyoto, Japan, Paper Number: 9210, 10-15 August 2014.
- 18) Burger, HF, Dirker J and Meyer JP, "Topology Optimisation for the Volume-to-Surface Problem in a Three-Dimensional Cubic Domain using Conduction Cooling", 15th International Heat Transfer Conference, IHTC 2014, Kyoto, Japan, Paper Number: 9207, 10-15 August 2014.
- 19) Prinsloo FPA, Dirker J, and Meyer JP, "Heat Transfer and Pressure Drop Characteristics in the Annuli of Tube-in-Tube Heat Exchangers – Horizontal Lay-Out", 15th International Heat Transfer Conference, IHTC 2014, Kyoto, Japan, Paper Number: 9225, 10-15 August 2014.
- 20) Adelaja AO, EWIM DR, Dirker J, and Meyer JP, "Experimental Investigation on Pressure Drop and Friction Factor in Tubes at Different Inclination Angles during the Condensation of R134a", 15th International Heat Transfer Conference, IHTC 2014, Kyoto, Japan, Paper Number: 9363, 10-15 August 2014.
- 21) Adelaja AO, Dirker J, and Meyer JP, "Experimental Studies of Condensation Heat Transfer in an Inclined Microfin Tube", 15th International Heat Transfer Conference, IHTC 2014, Kyoto, Japan, Paper Number: 9361, 10-15 August 2014.
- 22) Okafor FI, Dirker J, and Meyer JP, "Numerical Study of Heat Transfer Coefficients for Circumferential Solar Flux Distributions on Linear Fresnel Concentrator Absorber Tubes.", 15th International Heat Transfer Conference, IHTC 2014, Kyoto, Japan, Paper Number: 9221, 10-15 August 2014.
- 23) Nel G, Dirker J and Meyer JP, "Two-dimensional Topology Optimization of Fluid Channel Distributions- Pressure Objective" 10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2014, Orlando, Florida, USA. Paper Number: 156903059, 14-16 July 2014.
- 24) Van der Westhuizen JE, Dirker, J, Meyer JP, "Investigation into Using Liquid Crystal Thermography for Measuring Heat Transfer Coefficients and Wall Temperature Profiles at Inlets of Underdeveloped Regions", 10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2014, Orlando, Florida, USA. Paper Number: 1569878271, 14-16 July 2014.
- 25) Okafor FI, Dirker J, and Meyer JP, "Numerical Simulation of Absorber Tubes with Non-Uniform Circumferential Heat Flux Distributions", Second Southern African Solar Energy Conference, SESEC 2014, Port Elizabeth, South Africa, Paper Number: 10, 27-29 January 2014.
- 26) Adelaja AO, Dirker J, and Meyer JP, "Condensation Heat Transfer Coefficients in Inclined Tubes", Second Southern African Solar Energy Conference, SESEC 2014, Port Elizabeth, South Africa, Paper Number: 25, 27-29 January 2014.
- 27) Van der Westhuizen JE, Dirker, J, Meyer JP, "Investigation of Heat Transfer and Temperature Profiles at Inlets and Undeveloped Flow Regions using Liquid Crystal Thermography", Second Southern African Solar Energy Conference, SESEC 2014, Port Elizabeth, South Africa, Paper Number: 16, 27-29 January 2014.
- 28) Adelaja AO, Dirker J, and Meyer JP, "Convective condensation heat transfer of R134a in tubes at different inclination angles", International Conference on Applied Energy, ICAE 2013, Pretoria, South Africa, Paper Number: ICAE2013-509, July 1-4, 2013.
- 29) Adelaja AO, Dirker J, and Meyer JP, "Laminar flow heat transfer in thick walled pipes with convective boundary conditions", Submitted to the International Conference on Applied Energy, ICAE 2013, Pretoria, South Africa, Paper Number: ICAE2013-408, July 1-4, 2013.
- 30) Adelaja A,O Dirker J, and Meyer JP, "Condensing heat transfer coefficients for R134a at different saturation temperatures in inclined tubes", ASME 2013 Summer Heat Transfer Conference, HT2013, Minneapolis, MN, USA, Paper number: HT2013-17375, July 14-19, 2013.
- 31) Meyer JP, Dirker J, Olivier JA, and Garach DV, "The influence of different types of inlets on heat transfer of tubed in the transitional flow regime", Proceedings of International Conference on Advances in Mechanical Engineering, ICAME, Pune, Maharashtra, India, Keynote Paper: ICAME-2013/K3, 29-31 May 2013.

- 32) Greenland M, Dirker J, and Meyer JP, "Conjugate three-dimensional numerical analysis of heat Transfer in a minichannel with changing geometrical constraints and thermal conductivity", South African Conference on Computational and Applied Mechanics 2012; Johannesburg, Paper Number 99, September 2012.
- 33) Garach D, Dirker J, and Meyer JP, "Heat transfer and pressure drop in microchannels with different inlet conditions for water in the laminar and transitional regimes", Proceedings of the 9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics; Malta, pp. 763 – 770, July 2012.
- 34) Van Zyl WR, Dirker J, and Meyer JP, "Single phase convective heat transfer and pressure drop coefficients in concentric annuli", Proceedings of the 9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Malta, pp. 753 – 762; July 2012.
- 35) Dirker J, and Meyer JP, "Thermal optimization for internal embedded conductive cooling schemes using topology optimization techniques", Proceedings of the ASME/JSME 2011 8th Thermal Engineering Joint Conference AJTEC2011, Honolulu, Hawaii, USA; Paper Number 44291, March 2011.
- 36) Ntuli MP, Dirker J, and Meyer JP; "Heat transfer and pressure drop coefficients for turbulent flow in concentric annular ducts"; Proceedings of the 19th International Congress of Chemical and Process Engineering, CHISA, Paper Number I6.4, August 2010.
- 37) Dirker J, and Meyer JP; "Topology optimization for an internal heat conducting cooling scheme in a square domain", Proceedings of the 7th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Paper Number 1735, July 2010.
- 38) Bello-Ochende T, Dirker J, and Meyer JP, "Three dimensional geometric optimisation of heat-generating plates cooled by forced convection", Proceedings of the 5th International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics, Paper number BT1, 2007
- 39) Dirker J, and Meyer JP; "Thermal characterisation of embedded cooling layers with negligible thermal interfacial resistance for orthogonal bi-directional external heat extraction" ; Proceedings of the 13th International Heat Transfer Conference; Sydney Australia, Paper CND-03, August 2006
- 40) Dirker J, and Meyer JP; "Thermal characterisation of parallel-running embedded cooling layers with negligible thermal interfacial resistance for single directional heat extraction"; Proceedings of the 4th International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics, Paper number DJ2, 2005
- 41) Dirker J, Van Wyk JD, and Meyer JP, "Embedded solid state cooling configurations in power electronics"; Proceedings of the 5th International Conference on Enhanced, Compact and Ultra-Compact Heat Exchangers: Science, Engineering and Technology, Whistler, Canada, pp. 470-476, 2005
- 42) Liu, W, Dirker J, and Van Wyk, JD, "Power density improvement in integrated electromagnetic passive modules with embedded heat extractors"; Proceedings of the 39th I.E.E.E. Industry Applications Society (IAS) Annual Meeting, Seattle, United States of America; Paper number IAS60p2, October 2004
- 43) Dirker J, Liu W, Van Wyk JD, and Meyer JP, "Evaluation of embedded heat extraction for high power density integrated electromagnetic power passives" Proceedings of the 35th I.E.E.E. Power Electronics Specialist Conference, Aachen, Germany; Paper number 11430; 21-25 June, 2004
- 44) Dirker J, Malan AG, and Meyer JP; "Numerical modeling and characterization of the thermal behavior of embedded rectangular cooling inserts in modern heat generating mediums", Proceedings of the 3rd International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics, Paper number DJ1, June 2004
- 45) Dirker J, Malan, AG, and Meyer JP; "Thermal characterization of rectangular cooling shapes in heat generating mediums – A three-dimensional investigation", Proceedings of the International Thermal Science Seminar (ITSS), Bled, Slovenia; Paper number B7-3; 13-16 June, 2004
- 46) Dirker J, Liu W, Van Wyk JD, and Meyer JP; "High power density electromagnetic modules with embedded heat extractors"; Centre for Power Electronics Systems (CPES) Power Electronic Seminar, Virginia Tech, Blacksburg, United States of America; Paper number T8.4; 18-20 April 2004,
- 47) Van der Vyver H, Dirker J, and Meyer JP; "Validation of a CFD model of a three-dimensional tube-in-tube heat exchanger", Proceedings of the 3rd International Conference on CFD in the

Minerals and Process Industries, CSIRO, Melbourne, Australia, pp. 235-240, 10-12 December 2003

- 48) Dirker J and Meyer JP; "Optimum rectangular embedded cooling structure shapes in heat generating mediums – A two-dimensional approach", Proceedings of the 2nd International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics, Paper number DJ1, 2003.
- 49) Dirker J and Meyer JP; "Convective heat transfer behaviour in concentric annuli", Proceedings of the 2nd International Conference on Applied Mechanics and Materials, pp. 108-114, 2003.
- 50) Dirker J and Meyer JP; "Heat transfer coefficients in concentric annuli", Proceedings of the 12th International Heat Transfer Conference, Grenoble, France, Vol. 2, pp. 147-152, 2002.
- 51) Dirker J and Meyer JP; "Heat transfer coefficients in concentric annuli", Proceedings of the 1st International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics, pp. 1093-1098, 2002.
- 52) Dirker J, Van der Hoek L, and Meyer JP; "Heat transfer augmentation with spiralled wired during the condensation in the annulus of a coiled tube-in-tube heat exchanger for hot-water heat pumps", Proceedings of the 3rd European Thermal Sciences Conference, pp. 1187-1192, 2000.

7.4 Non-refereed publications or popular articles

Provide full details of each publication, including full titles, names of all the authors, journals, dates, page numbers etc.

- None at present

7.5 Patents

- De Beers Consolidated Mines limited; Labotski A.U.; Hill G.J; Dirker J.; Green J.J.; Maunye L.; Kruger M. J.; Viranna N. B.; Manilall N. "An apparatus for and method of sorting objects using reflectance spectroscopy"; World Intellectual Property Office, Publication Number: WO/2006/054154; 26/05/2006

7.6 Technical reports

- None at present

8. OTHER SCHOLARLY RESEARCH-BASED CONTRIBUTIONS

8.1 Participation in conferences, workshops and short courses - specify type of contribution

Provide full details of participation in national and international conferences etc

8.1.1 National

- None at present

8.1.2 International

- None at present

8.2 Teamwork and collaboration with others:

- Other researchers (national and international) : None at present
- Other research institutions (national and international): None at present
- Industry: None at present

8.3 Membership in national and international bodies

- Registered as a professional Engineer at the Engineering Council of South Africa from 1 December 2010. Registration number: 20100440
- American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE): 2021 to present.

8.4 Visits to local and overseas universities or research institutes as guest professor or researcher

- Secondment to University of Edinburgh as part of the European Union Horizon 2020 initiative in the “ThermaSMART” Project: 2019

9. ARTISTIC OUTPUTS (if applicable)

9.1 Provide full details of artistic outputs, including public reviews of work, coordinating reports by experts in the field, publisher, production company etc

- None at present

10. MANAGEMENT AND ADMINISTRATIVE DUTIES

10.1 List your involvement in departmental activities (e.g. administrative functions), faculty (e.g. Faculty Committees) or other university activities.

- Large Modules Committee: Faculty of Engineering, Built Environment and Information Technology: 2008 -2009
- Departmental Management Committee: 2016 to present
- Departmental Marketing Committee Chairperson: 2017 to present
- Departmental Postgraduate Program Coordinator: 2021 to present

11. COMMUNITY SERVICE OR PROFESSIONAL SKILLS

11.1 Outreach projects

(e.g. project titles, institutions and communities involved, etc.)

- None at present.

11.2 Professional service performed

(e.g. courses presented, lectures at professional associations/clubs, radio or TV appearances, outside expert or appointment committee, etc.)

- ASHREA University of Pretoria Student Chapter: Faculty Advisor: 2021 to present

11.3 Clinical service

(e.g full detail of rank/level of joint appointment, level of clinical service rendering responsibilities, university administration and academic responsibilities, CPD involvement, clinical trials involvement, etc.)

- None at present.

11.4 Involvement with other universities/scientific institutions

(e.g. external examiner, editor of journal, advisory council, CSIR, SA Council for Scientific Professions)

External Examiner for Academic Modules:

- External Examiner for University of Johannesburg: Final year Mechanical Engineering Project and Design: 2005, 2006, 2007, 2011, 2014, 2021
- External Examiner for University of Cape Town: “Dynamics II” (MEC3031S): 2007.
- External Examiner for University of Cape Town: “Thermodynamics for Nuclear Power

Stations" (EEE4107Z) 2015-2018.

- External Examiner for University of Cape Town: Thermofluids III" (MEC3044S): 2017-2018.
- External Examiner for University of Cape Town: Thermofluids IV" (MEC4125S): 2017-2021
- External Examiner for North-West University: "Engineering Drawings", 2008.
- External Examiner for North-West University: "Heat Transfer" (INGM 412), 2013.

External Examiner for Dissertations:

- External Examiner for University of Cape Town: Post Graduate Master-degree projects.
- External Examiner for University of Stellenbosch: Post Graduate Master-degree projects.
- External Examiner for North-West University: Post Graduate Master-degree projects.

11.5 Referee duties

- International Journal of Refrigeration
- International Journal of Heat and Mass Transfer
- Renewable Energy
- Applied Energy
- Heat Transfer Engineering – An international Journal
- International Journal of Thermal Sciences
- Several International Conferences (HEFAT, IHTC, SASEC etc.)

12. AWARDS AND SCIENTIFIC/SCHOLARLY RECOGNITION

12.1 Evaluation status as scientist/scholar

- NRF Rated C2 researcher (2021-2026)
- NRF Rated C3 researcher (2015-2020)
- NRF Rated Y2 researcher (2009-2014)

12.2 Research awards and prizes

- *Outstanding Paper Award: Emerald LiteratiNetwork 2008 for:* DIRKER J, MALAN, AG, and MEYER JP; "Thermal Characterisation of Rectangular Cooling Shapes in Solids", International Journal of Numerical Methods for Heat Fluid and Flow, Vol. 17, pp. 361-383, 2007
- *Outstanding Paper Award: Best Paper in the session on Experimental Methods:*" Investigation into Using Liquid Crystal Thermography for Measuring Heat Transfer Coefficients and Wall Temperature Profiles at Inlets of Underdeveloped Regions", 10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2014, Orlando, Florida, USA. Paper Number: 1569878271, 14-16 July 2014.
- *Outstanding Paper Award: Best Paper in the session on Boiling 2:* "Preliminary investigation into the effect of step changes in boiling heat flux on R134a in a horizontal macro tube", 14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, HEFAT 2017, Wicklow, Ireland, 22-24 July 2019

12.3 Teaching awards and prizes

- Faculty Teaching awards: Voted best online lecturer by the Engineering, Built Environment and Information Technology Student House: 2021
- Faculty Teaching awards: Voted most prepared/organised lecturer by the Engineering, Built Environment and Information Technology Student House: 2020
- Faculty Teaching awards: Voted most reliable lecturer by the Engineering, Built Environment and Information Technology Student House: 2019
- Departmental Teaching awards: Best lecturer in the Department of Mechanical and Aeronautical Engineering: 2007, 2018
- Faculty Teaching awards: Runner up best lecturer in Faculty of Engineering, Built Environment and Information Technology: 2018.

12.4 Artistic awards and prizes

None at present.