Curriculum Vitae

Qian Huang *Research Assistant (Postdoc)*

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Education

- BSc, Dept. of Thermal Engineering, Tsinghua University, China 2008-2012
- PhD, Dept. of Energy and Power Engineering, Tsinghua University, China 2012-2017

Research Experience

Postdoc, Group of Prof. Dr. Christian Rohde 2024-now
Institute of Applied Analysis and Numerical Simulation, University of Stuttgart, Germany

Research Assistant Professor 2019-2024
Department of Energy and Power Engineering, Tsinghua University, China

Postdoc Research, Group of Prof. Wen-An Yong 2017-2019
Zhou Pei-Yuan Center for Applied Mathematics, Tsinghua University, China
Project: *Moment closure of population balance equation and its applications*

PhD Research, Supervisors: Prof. Qiang Yao and Prof. Shuiqing Li 2012-2017
Thesis: *Mechanisms on the particulate formation and ash deposition in pulverized coal combustion*

Research Interests

- Kinetic model theory and applications
- Combustion-related energy conversion & propulsion
- Active particle systems

Research Funding

- **DFG (German Research Foundation) - SPP 2410**, Contributor 2024-2026
- **National Science Foundation for Young Scientists of China**, PI. 2020-2022
- **China Postdoctoral Science Foundation**, PI. 2017-2019
- **Over 10 industry-supported projects**, PI. 2019-2024

Honors & Awards

- Gold medal of the International Exhibition of Inventions Geneva, 2023 (with Prof. Shuiqing Li and others)
- The first prize of Natural Science Award of Ministry of Education of China, 2022 (with Prof. Shuiqing Li and others)

- Best Paper Award of China National Symposium on Combustion, 2021 (with Prof. Shuiqing Li and others)
- Equipment Management & Technical Innovation in Power Industry, First prize, 2021 (with Prof. Shuiqing Li and others)
- Tsinghua-IHI Scholarship, Tsinghua University, 2016
- China Scholarship Council Scholarship, Ministry of Education of China, 2015
- Tsinghua-GuangHua Scholarship, Tsinghua University, 2013
- National Encouragement Scholarship, Ministry of Education of China, 2010
- National Encouragement Scholarship, Ministry of Education of China, 2009

Academic activities

- Member of the Combustion Institute
- Member of the Young Scholar Committee of the China Electric Power Research Institute Journals Center
- **Reviewer**: Chemical Engineering Science, Proceedings of the Combustion Institute, Combustion and Flame, Energy, Combustion Science and Technology, Fuel, Energy & Fuels, Energy Conversion Management (X), Power Technology, ACS Omega, Journal of the Energy Institute, Journal of Thermal Science, Frontiers in Energy, Waste and Biomass Valorization, Proceedings of the CSEE (in Chinese), Clean Coal Technology (in Chinese), Asia-Pacific Conference on Combustion, China National Symposium on Combustion.
- **Colloquium chair** and **Session chair** of the 10th International Symposium on Coal Combustion (Aug 7-9, 2023, Taiyuan, China).
- **Session chair** of the China National Symposium on Combustion 2023 (Oct 12-15, 2023, Hefei, China).

Skills

- Analysis of moment closure systems
- Simulation: C++, Fortran, Julia, Matlab, Mathematica, ANSYS Fluent, OpenFOAM
- Design, measurement and simulation of particle-laden flows in combustion

Teaching

- ***Combustion Theory*** (Undergraduate, given by Prof. Shuiqing Li and me during 2020-2023 at Tsinghua University, in Chinese).

Publications

Journal articles

➢ *Modeling & Analysis of Complex Systems*

[1] Y Chen, **Q Huang***, W-A Yong, R Zhang. Poisson quadrature method of moments for 2D kinetic equations with velocity of constant magnitude. *Multiscale Modeling and Simulation*, 2025, in press. arXiv:2308.10083.

[2] R Zhang, **Q Huang***, W-A Yong. Stability analysis of an extended quadrature method of moments for kinetic equations. *SIAM Journal on Mathematical Analysis*, 2024, 56(4): 4687-4711.

[3] Y Chen, **Q Huang***, W-A Yong. Discrete-velocity-direction models of BGK-type with

minimum entropy: II. Weighted model. *Journal of Scientific Computing*, 2024, 99: 84.

[4] **Q Huang**, Y Chen, W-A Yong. Discrete-velocity-direction models of BGK-type with minimum entropy: I. Basic idea. *Journal of Scientific Computing*, 2023, 95: 80.

[5] **Q Huang**, J Koellermeier, W-A Yong. Equilibrium stability analysis of hyperbolic shallow water moment equations. *Mathematical Methods in the Applied Sciences*, 2022, 45: 6459-6480.

[6] **Q Huang**, S Q Li, W-A Yong. Stability analysis of quadrature-based moment methods for kinetic equations. *SIAM Journal on Applied Mathematics*, 2020, 80: 206-231.

[7] **Q Huang***, C Rohde, W-A Yong, R Zhang. A hyperbolic relaxation system of the incompressible Navier-Stokes equations with artificial compressibility. 2024, arXiv:2411.15575.

[8] R Zhang, Y Chen, **Q Huang***, W-A Yong. Dissipativeness of the hyperbolic quadrature method of moments for kinetic equations. 2024, arXiv:2406.13931.

[9] H Lin, **Q Huang***, S Q Li. Evolution of dust clouds on Mars with hydrodynamic interactions in the transition-flow regime. 2024, submitted.

[10] **Q Huang**, J Koellermeier. Complex shallow flows. In preparation.

➢ *AI for Energy*

[1] Z Wang, **Q Huang***, K Wang, et al. Knowledge-inspired data-driven prediction of metal overheating risks in flexible utility boilers. *Applied Energy*, 2024, 364: 123185.

[2] Z Wang, **Q Huang**, K Wang, S Q Li. Real-time optimization analysis of coal consumption of co-generation units under varied loads. *Proceedings of the CSEE*, 2023, 43: 1347-1358. https://dx.doi.org/10.13334/j.0258-8013.pcsee.222277 (in Chinese)

[3] Z Wang, **Q Huang***, K Wang, et al. Studies on key technology of intelligent big-data cloud platform for coal-fired power plants. *Journal of Chinese Society of Power Engineering*, 2024, accepted. (in Chinese)

[4] X Sha, **Q Huang***, G Liu, S Q Li. Time series analysis of monitored heating surface wall temperature of coal-fired boiler. *Journal of Combustion Science and Technology*, 2021, 27(5): 475-481. (in Chinese)

[5] Z Wang, **Q Huang***, G Liu, et al. Flexibility-oriented safety assessment strategy for air preheater in thermal power units adapting to the advanced power system. *Southern Energy Construction*, 2024, accepted. (in Chinese)

➢ *Solid Fuel Combustion*

[1] L Duan, J Wang, **Q Huang***, et al. Experimental investigation on the performance of hybrid electrostatic-fabric precipitators with different structures. *Powder Technology*, 2023, 421, 118404.

[2] L Duan, **Q Huang***, R Ji, S Q Li. A predictive model of synergetic particulate-SO_3 removal in ultralow cold-side electrostatic precipitators. *Journal of Aerosol Science*, 2022, 159: 105850.

[3] **Q Huang**, P Ma, Q Gao, S Q Li. Ultrafine particle formation in pulverized coal, biomass and waste combustion: Understanding the relationship with flame synthesis process. *Energy & Fuels*, 2020, 34: 1386-1395.

[4] **Q Huang**, P Ma, L Cai, S Q Li. Kinetic simulation of fine particulate matter evolution and deposition in a 25 kW pulverized coal combustor. *Energy & Fuels*, 2020, 34: 15389-15398.

[5] **Q Huang**, S Q Li, Y Shao, Y Zhao, Q Yao. Dynamic evolution of impaction and sticking behaviors of fly ash particle in pulverized coal combustion. *Proceedings of the Combustion*

Institute, 2019, 37: 4419-4426.

[6] **Q Huang**, Y Zhang, Q Yao, S Q Li. Mineral manipulation of Zhundong lignite towards fouling mitigation in a down-fired combustor. *Fuel*, 2018, 232: 519-529.

[7] **Q Huang**, Y Xu, Q Yao, S Q Li. *In situ* diagnostics on the dynamic processes of ash deposit formation, shedding, and heat transfer in a self-sustained down-fired furnace. *Energy & Fuels*, 2018, 32: 4424-4431.

[8] **Q Huang**, S Q Li, G D Li, Q Yao. Mechanisms on the size partitioning of sodium in particulate matter from pulverized coal combustion. *Combustion and Flame*, 2017, 182: 313-323.

[9] **Q Huang**, Y Zhang, Q Yao, S Q Li. Numerical and experimental study on the deposition of fine particulate matter during the combustion of pulverized lignite coal in a 25 kW combustor. *Powder Technology*, 2017, 317: 449-457.

[10] **Q Huang**, S Q Li, G D Li, Y Q Zhao, Q Yao. Reduction of fine particulate matter by blending lignite with semi-char in a down-fired pulverized coal combustor. *Fuel*, 2016, 181: 1162-1169.

[11] Y Yang, **Q Huang**, P Ma, S Q Li. Mechanistic studies on the slagging propensity in low-rank coal combustion. *Combustion and Flame*, 2022, 238: 111956.

[12] P Ma, **Q Huang**, Y Yang, S Q Li. Simultaneous investigation of coal ignition and soot formation in two-stage O_2/N_2 and O_2/CO_2 atmospheres. *Fuel*, 2022, 314: 122808.

[13] Y Xu, **Q Huang**, S Q Li. Numerical investigation of physicochemical effects of CO_2 on coal particle ignition in O_2/CO_2 ambience. *Fuel*, 2021, 287: 119542.

[14] Y Zhao, **Q Huang**, Q Yao, S Q Li. Prediction and validation of ash sticking probability under fouling conditions in pulverized coal combustion. *Proceedings of the Combustion Institute*, 2021, 38: 5311-5318.

[15] M Song, **Q Huang**, F Niu, S Q Li. Recirculating structures and combustion characteristics in a reverse-jet swirl pulverized coal burner. *Fuel*, 2020, 270: 117456.

[16] P Ma, **Q Huang**, Q Gao, S Q Li. Effects of Na and Fe on the formation of coal-derived soot in a two-stage flat-flame burner. *Fuel*, 2020, 265: 116914.

[17] A Adeosum, **Q Huang**, T Li, A Gopan et al. Characterization of a new Hencken burner with a transition from a reducing-to-oxidizing environment for fundamental coal studies. *Review of Scientific Instruments*, 2018. 89(2).

[18] G D Li, S Q Li, **Q Huang**, Q Yao. Fine particulate formation and ash deposition during pulverized coal combustion of high-sodium lignite in a down-fired furnace. *Fuel*, 2015, 143: 430-437. (**ESI highly cited paper**)

[19] G D Li, S Q Li, X G Xu, **Q Huang**, Q Yao. Dynamic behavior of biomass ash deposition in a 25kW one dimensional down-fired combustor. *Energy & Fuels*, 2014, 28: 219-227.

[20] Y Yang, **Q Huang***, Y Zhan, S Q Li. Quantitative measurement of the sticking probability of solid-fuel-generated ash particles at elevated temperature. *Journal of Engineering Thermophysics*, 2023, 44(1): 244-249. (in Chinese)

[21] **Q Huang**, S Q Li, G D Li, Q Yao. Simulations of fine particle progressive evolution in a pulverized coal combustor. *Journal of Engineering Thermophysics*, 2014, 35(5): 1026-1029. (in Chinese)

[22] K Wang, **Q Huang**, P Ma, Y Yang, S Q Li. Coupling of population balance model with reactor network in pulverized coal combustion. *Journal of Engineering Thermophysics*, 2024, accepted. (in Chinese)

[23] S Xiao, **Q Huang**, S Q Li. Investigation of droplet combustion characteristics of boron-based nanofluid fuels. *Journal of Engineering Thermophysics*, 2024, 45(8): 2524-2530. (in

Chinese)

[24] Y Li, **Q Huang**, P Ma, R Kneer, S Q Li. Experimental and numerical study on the combustion characteristics of standard swirl flame. *Journal of Engineering Thermophysics*, 2022, 43(4): 1091-1096. (in Chinese)

[25] P Ma, **Q Huang***, H Yan, R Ji, S Q Li. Laser-induced incandescence (LII) diagnostics on sodium-soot interaction in early stage of pulverized coal combustion. *Coal Conversion*, 2022, 45(3): 11-17. http://dx.doi.org/10.19726/j.cnki.ebcc.202203002 (**cover paper**, in Chinese)

[26] Y Xu, **Q Huang**, M Song, S Q Li. Theoretical study on the effect of particle spacing on ignition and combustion behavior of pulverized coal particles. *Journal of China Coal Society*, 2022, 47(4): 1701-1708. http://dx.doi.org/10.13225/j.cnki.jccs.2021.0398 (in Chinese)

[27] M Wang, **Q Huang**, W Cao, S Q Li. Numerical investigation on the flow field and performance optimization of the direct air-cooled condenser. *Clean Coal Technology*, 2022, 28(4): 66-74. http://dx.doi.org/10.13226/j.issn.1006-6772.21031102 (in Chinese)

[28] P Ma, **Q Huang**, S Q Li. Effect of soot-mineral interaction on fine particulate formation in pulverized coal combustion. *Journal of Engineering Thermophysics*, 2021, 42(7): 1895-1900. (in Chinese)

[29] M Song, Y Huang, **Q Huang**, S Q Li. Discussion on low-load stable combustion technology of swirl pulverized-coal burner. *Proceedings of the CSEE*, 2021, 41(13): 4552-4565. http://www.pcsee.org/CN/10.13334/j.0258-8013.pcsee.210311 (in Chinese)

[30] S Xiao, **Q Huang**, S Q Li. Effect of addition of energetic boron nanoparticles on ignition, burning, and micro-explosion of falling ethanol droplets. In preparation.

➢ *Ammonia Combustion*

[1] P Ma, **Q Huang***, T Si, Y Yang, S Q Li. Experimental investigation of NOx emission and ash-related issues in ammonia/coal/biomass co-combustion in a 25-kW down-fired furnace. *Proceedings of the Combustion Institute*, 2023, 39: 3467-3477. (**ESI highly cited paper**)

[2] P Ma, **Q Huang***, Z Wu, J Lyu, S Q Li. Optical diagnostics on coal ignition and gas-phase combustion in co-firing ammonia with pulverized coal on a two-stage flat flame burner. *Proceedings of the Combustion Institute*, 2023, 39: 3457-3466.

[3] Y Yang, **Q Huang**, P Ma, T Si, S Q Li. Expanding low NOx emission range of NH_3/CH_4 flames via fuel nitrogen/hydrocarbon separation in two-stage tangential swirling burner. *Fuel*, 2025, 385: 134029.

[4] P Ma, **Q Huang**, Z Wu, et al. Comprehensive effect of the coal rank and particle size on ammonia/coal stream ignition. *Proceedings of the Combustion Institute*, 2024, 40, 105464.

[5] J Sun, **Q Huang**, Y Tang, S Q Li. Stabilization and emission characteristics of gliding arc-assisted NH_3/CH_4/air premixed flames in a swirl combustor. *Energy & Fuels*, 2022, 36: 8520-8527. (**Cover paper**)

[6] Y Yang, **Q Huang**, J Sun, P Ma, S Q Li. Reducing NOx emission of swirl-stabilized ammonia/methane tubular flames through a fuel-oxidizer mixing strategy. *Energy & Fuels*, 2022, 36: 2277-2287. (**Cover paper**)

[7] Y Li, J Sun, **Q Huang**, R Kneer, S Q Li. Experimental investigation on the effects of air/fuel distribution on stability limit and NOx emission of NH_3/CH_4/air flame. *Combustion and Flame*, 2024, 268: 113606.

[8] P Ma, H Nicolai, **Q Huang**, et al. Numerical investigation on pyrolysis and ignition of ammonia/coal blends during co-firing. *Combustion and Flame*, 2024, 261: 113268.

[9] Tong S, **Q Huang**, Y Yang, et al. Advancements and future outlook in fundamental research and technological applications for ammonia co-firing with coal. *Journal of China Coal Society*, 2024, 49(6): 2876-2886. Doi: 10.13225/j.cnki.jccs.ZZ23.1476. (in Chinese)

[10] Y Di, **Q Huang**, P Ma, F Niu, S Q Li. Experimental investigation on combustion characteristics of cofiring biomass with ammonia. *Proceedings of the CSEE*, 2022, 42(18): 6547-6552. http://www.pcsee.org/CN/10.13334/j.0258-8013.pcsee.220414 (in Chinese)

[11] J Sun, **Q Huang**, Y Zhang, Y Yang, S Q Li. Stabilization and NOx emission of gliding arc-assisted CH_4/NH_3 swirl flames. *Journal of Engineering Thermophysics*, 2022, 43(8): 2234-2241. (in Chinese)

[12] Z Wu, **Q Huang**, P Ma, et al. Single-coal-particle ignition in cofiring ammonia with coal. *Clean Coal Technology*, 2023, 29(10): 108-115. Doi: 10.13226/j.issn.1006-6772.F23032801 (in Chinese)

Chapters / Conference proceedings

[1] Z Wang, K Wang, **Q Huang***, W Cao, S Q Li. Predicting the minimum load of coal-fired unit limited by the selective catalytic reduction system. 13th Asia-Pacific Conference on Combustion (ASPACC 2021), 2021-December.

[2] P Ma, **Q Huang**, Y Yang, S Q Li. Investigation of coal-derived soot formation characteristics during oxy-coal combustion in reducing-to-O_2/CO_2 ambiences. 13th Asia-Pacific Conference on Combustion (ASPACC 2021), 2021-December.

[3] Y Li, **Q Huang**, Y Yang, P Ma, S Q Li. Experimental and numerical study on the ammonia-coal co-combustion characteristics on a swirl burner. 13th Asia-Pacific Conference on Combustion (ASPACC 2021), 2021-December.

[4] Y Li, **Q Huang***, L Duan, S Q Li. Numerical investigation of fly ash deposition onto tube bundles inside coal-fired boilers. In: Lyu J., Li S. (eds) *Clean Coal and Sustainable Energy*. ISCC 2019. Environmental Science and Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-16-1657-0_17

[5] C Li, **Q Huang***, G Liu, S Q Li. In situ visual monitoring of rotary air preheater blockage: Setup and image analysis. In: Lyu J., Li S. (eds) *Clean Coal and Sustainable Energy*. ISCC 2019. Environmental Science and Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-16-1657-0_65

[6] Z Lyu, **Q Huang***, Y Yang, S Q Li. Technical measures in design and operation of the 1000MW supercritical boiler burning high-slagging-propensity coal. In: Lyu J., Li S. (eds) *Clean Coal and Sustainable Energy*. ISCC 2019. Environmental Science and Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-16-1657-0_80

[7] L Duan, **Q Huang**, S Q Li. A population balance model for fine particle removal inside the electrostatic precipitator. In: Lyu J., Li S. (eds) *Clean Coal and Sustainable Energy*. ISCC 2019. Environmental Science and Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-16-1657-0_73

[8] **Q Huang**, Q Yao, S Q Li. The progressive ash formation and deposition dynamics in a 25 kW coal combustor. 11th Asia-Pacific Conference on Combustion (ASPACC 2017), 2017-December.

Talks

[1] Title: Statistical conservation laws for the scalar and Navier-Stokes equations. *The 95th Annual Meeting of the International Association of Applied Mathematics and Mechanics*, Apr 7-11, 2025, Poznan, Poland.

[2] Title: Structure-preserving method of moments with applications to active matter systems. Faculty of Mathematics, University of Vienna, Oct 30, 2024, Vienna.

[3] Title: The relationship between kinetic equations and hyperbolic conservation systems. Academy for multidisciplinary studies, Capital Normal University, Jul 12, 2024, Beijing.

[4] Title: Poisson quadrature method of moments for 2D kinetic equations with velocity of constant magnitude. *The 19th International Conference on Hyperbolic Problems: Theory, Numerics and Applications*, July 1-5, 2024, Shanghai, China.

[5] Title: Statistical conservation laws for scalar model problems. *SPP-2410 CoScaRa webinar*, May 17, 2024, held virtually.

[6] Title: NOx reduction techniques in co-firing ammonia with fossil fuels. *The 2nd Technical Seminar on Efficient Management of Flue Gas and Green and Low-Carbon Development in Non-ferrous Metal Industry*, Dec 16-17, 2023, Changsha, China.

[7] Title: Prediction and in situ monitoring of ash deposition from burning typical low-rank coal. *China National Symposium on Combustion 2023*, Oct 12, 2023, Hefei, China.

[8] Title: Poisson method of moments for kinetic equations of polar active matter. *Sino-German workshop on advanced numerical methods for hyperbolic balance laws*, Sept 25-27, 2023, Beijing, China.

[9] Title: Stability-preserving quadrature-based moment-closure model hierarchy. Peking University, Sep 13, 2023, Beijing; and Southern University of Science and Technology, Sep 15, 2023, Shenzhen.

[10] Title: Moment methods for a kinetic model of polar active matter. *The Second HKSIAM Biennial Meeting*, Aug 28-Sep 1, 2023, Hong Kong.

[11] Keynote speech: Data centric techniques for safe and efficient operation of coal-fired power units. *The 10th International Symposium on Coal Combustion*, Aug 7-9, 2023, Taiyuan, China.

[12] Title: Quadrature-based moment methods for kinetic equations: Stability analysis & multidimensional models. Academy for multidisciplinary studies, Capital Normal University, Jun 13, 2023, Beijing.

[13] Title: Fine particulate evolution and co-firing with carbon-free fuels in pulverized coal combustion, Institute for Computational Mathematics. Chinese Academy of Science, May 24, 2023, Beijing

[14] Title: Discrete-velocity-direction models of BGK-type with minimum entropy. *NSNMF20*, Mar 31-Apr 2, 2023, Nanjing, China.

[15] Title: Method of moments for solving kinetic equations. *Applied and Computational Math Colloquium* of YMSC, Tsinghua University, Mar 16, 2023.

[16] Title: Discrete-velocity-direction models of BGK-type with minimum entropy. *CSIAM 2022*, Nov 19-20, 2022, held virtually.

[17] Title: Technical and economic analysis of co-firing ammonia with fossil fuels towards carbon neutrality. *The 6th National Yong Scholar Meeting on Combustion Research*, May 21-23, 2021, Hangzhou, China.

[18] Title: Equilibrium stability analysis of hyperbolic shallow water moment equations. *SIAM Conference on Computational Science and Engineering*, Mar 1-5, 2021, held virtually.

[19] Title: Stability analysis of quadrature-based moment methods for kinetic equations. *Sino-German workshop on advanced numerical methods for hyperbolic balance laws*, Sept 25-27, 2019, Beijing, China.

[20] Title: Kinetic simulation of fine particulate matter evolution & deposition inside a 25-kW pulverized coal combustor. *14th International Conference on Energy for a Clean Environment*, Sept 8-12, 2019, Madeira, Portugal.

[21] Title: Numerical & Experimental investigations of ash deposition onto tube bundles in pulverized coal combustion: Impaction & Sticking. *9th International Symposium on Coal Combustion*, July 21-24, 2019, Qingdao, China.

[22] Title: Towards fouling mitigation in the utilization of solid fuel: An active control of fuel property and operation conditions. *10th International Conference on Applied Energy*, August 22-25, 2018, Hong Kong.

[23] Title: Dynamic evolution of impaction and sticking behaviors of fly ash particle in pulverized coal combustion. *37th International Symposium on Combustion*, July 29-August 3, 2018, Dublin, Ireland.

[24] Title: The progressive ash formation and deposition dynamics in a 25 kW coal combustor. *11th Asia-Pacific Conference on Combustion*, Dec 10-14, 2017, Sydney, Australia.

[25] Title: In-situ diagnostics on the dynamic processes of ash deposit formation, shedding and heat transfer. *6th Sino-Australian Symposium on Advanced Coal and Biomass Utilisation Technologies*, Dec 4-8, 2017, Perth, Australia.

[26] Title: Impaction and sticking behaviors of ash particles inside a coal-fired furnace. *China National Symposium on Combustion 2017*, Nanjing.

[27] Title: Sub-micron particle formation during pulverized coal combustion in a flat-flame burner. *2016 US Spring Technical Meeting*, May 15-17, 2016, Knoxville.

[28] Title: Mechanisms for the size partitioning of several volatile species in the particulates formed during pulverized coal combustion. *The 9th US National Combustion Meeting*, May 17-20, 2015, Cincinnati.

[29] Title: Dynamic simulations of the alkali vapor-particulate interactions during pulverized coal combustion. *China National Symposium on Combustion 2014*, Xi'an.

[30] Title: Simulation of fine particle evolution inside a pulverized coal combustor. *China National Symposium on Combustion 2013*, Chongqing.

Patents

[1] **Q Huang**, X Sha, S Q Li, et al. Optimization method and system for air distribution in coal-fired boilers. China Patent Granted, CN202110179184.2.

[2] S Q Li, **Q Huang**, M Wang, et al. Air-cooled condenser and its control methods. China Patent Granted, CN202110673195.6.

[3] G Liu, **Q Huang**, Z Ma, et al. A device and method for online measurements of fly ash carbon content. China Patent Granted, CN201911218193.7.

[4] G Liu, S Q Li, **Q Huang**, et al. A method to monitor the air preheater blockage. China Patent Granted, CN201911218258.8.

[5] S Q Li, M Song, **Q Huang**, et al. Low carbon swirl burner with adjustable flame diameters. China Patent Granted, CN202110713084.3.

[6] S Q Li, M Song, **Q Huang**, et al. Annular wall-heating reversed-jet pulverized coal combustor. China Patent Granted, CN202011026288.1.

[7] S Q Li, M Song, **Q Huang**, et al. A swirl burner and the operation method for flame stabilization based on similarity criteria. China Patent Granted, CN202010181455.3.

[8] S Q Li, M Song, **Q Huang**, et al. A fast-pyrolysis staged-injection probe of ammonia fuel. China Patent Granted, CN202111040556.X.

[9] S Q Li, M Song, J Sun, **Q Huang**. Atmosphere-adjustable multi-staged swirl ammonia

burner. USA Patent Granted, 17580504.

[10] S Q Li, X Si, **Q Huang**. Vacuum thermal decomposition device. China Patent Application, CN202410369348.1.

[11] S Q Li, X Si, **Q Huang**. Lunar base energy system and method of supply. China Patent Application, CN202410601836.0.

Software Copyrights

[1] Software for predicting the load-variation ability of thermal power units V1.0. China Computer Software Copyright, 2022SR0000733.

[2] Software for optimizing NOx removal in flexible operations of coal-fired units V1.0. China Computer Software Copyright, 2022SR0153204.

[3] Software for predicting the initial ash deposition rate onto the heating surfaces in coal-fired units V1.0. China Computer Software Copyright, 2022SR0153244.

[4] Software for predicting the fly ash size distributions from pulverized coal combustion V1.0. China Computer Software Copyright, 2021SR0240152.

[5] Software for analyzing and predicting overheating of boiler surfaces in thermal power units V1.0. China Computer Software Copyright, 2022SR0153203.

[6] Software for predicting the evolution of carbonaceous particles in solid fuel combustion V1.0. China Computer Software Copyright, 2022SR0213903.

[7] Software for predicting the particulates evolution in co-firing ammonia with coal V1.0. China Computer Software Copyright application.

[8] Software for optimizing the coal consumption of CHP units with flexible outputs V1.0. China Computer Software Copyright application.

References

Available upon request