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教育背景

1989年考入清华大学热能工程系, 1994年毕业, 获学士学位。同年免试于清华大学热能工程系直接攻读工程热物理专业博士学位, 1999年毕业, 同时获工学硕士、博士学位。

工作经历

1999年8月至2000年5月, 在北京应用物理与计算数学研究所任助理研究员, 从事多相反应流的计算方法研究。2000年5月至今, 在清华大学热能工程系任讲师、副研究员, 从事燃烧污染控制研究。其间, 2001年11月至2003年3月, 在日本东京大学化学系统工程系做访问学者, 从事新型烟气脱硫技术的研发。

研究领域

燃烧污染控制

研究概况

作为项目负责人承担了863重大项目课题“中小锅炉Nox控制技术和应用示范”、科技攻关项目“工业锅炉洁净干法联合减排系统技术”, 国际合作项目“陶瓷颗粒捕集器再生过程的传热和炭烟氧化模拟”、“Advanced SCR Control for a Thermal Power Plant”、“Study of Honeycomb Substrate and Diesel Particulate Filters”, 企业横向合作项目“新型干法回转窑烟气治理成套技术装备开发”、“SCR烟气脱硝催化剂模块开发”、“煤的回转窑热解实验”, 清华大学机械学院研究基金“利用氮氧化物促进烟气干法脱硫反应的实验研究”等。

作为学术骨干参加了“燃烧源可吸入颗粒物形成和控制技术基础研究”等多个973、863和攻关项目, 以及国际合作和横向项目。

学术成果

主要学术论文如下:

1. Song Qiang, Wu Mingchang, Yang Xianyong. Measurement of liquid velocity in laminar bubbly flow with cylindrical hot-film probe. In: Proceedings of the Second International Symposium on Measuring Techniques for Multiphase Flows (ISMTMF'98). By: Xu Yiqian and Zhang Baofeng eds. Aug. 30-Sept. 1, 1998, Beijing, China. Beijing: Standards Press of China, 1998, p.105-110
2. Song Qiang, Wang Shujuan, Yao Qiang, Xu Xuchang. Nitrogen dioxide reaction with calcium based sorbent during dry flue gas desulfurization. In: Proceedings of the International Conference on Energy Conversation and Application (ICECA'2001). By: Liu Wei eds. June 17-20, 2001, Wuhan, China. Wuhan: Huazhong University of Science and Technology Press, 2001, p.752-755 (ISTP BS85M, EI03137412495)
3. Wang Shujuan, Song Qiang, Chen Changhe. Life cycle assessment on energy utilization technologies. In: Proceedings of the International Conference on Energy Conversation and Application (ICECA'2001). By: Liu Wei eds. June 17-20, 2001, Wuhan, China. Wuhan: Huazhong University of Science and Technology Press, 2001, p. 166-168 (ISTP BS85M, EI03137413478)

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4. Song Qiang, Luo Rui, Yang Xianyong, Wang Zhou. Phase distribution for upward laminar dilute bubbly flow with non-uniform bubble sizes in a vertical pipe. *Int J Multiphase Flow*, 2001, 27: 379-390 (SCI 391DQ, EI 01015463277)
5. Luo Rui, Song Qiang, Yang Xianyong, Wang Zhou. Developed 'laminar' bubbly flow with non-uniform bubble sizes. *Science in China (Series E)*, 2001, 44(1): 47-54 (SCI 406BT, EI01236530997)
6. 赵士杭, 吕泽华, 宋蓄. 联合循环发电用于Corex熔融还原. *燃气轮机技术*, 1995, 8(4):1-8.
7. 宋蓄, 杨献勇, 罗锐, 王洲. 层流泡状流运动的数学模型. *清华大学学报*, 1998, 38(5): 55-58 (EI 99034620583)
8. 宋蓄, 罗锐, 杨献勇, 王洲. 垂直管道内层流泡状流运动的多流体模型. *清华大学学报*, 2000, 40(6): 49-52 (EI 01035572548)
9. 宋蓄, 罗锐, 杨献勇, 王洲. 用于测量泡状流相分布的三维照相法. *清华大学学报*, 2001, 41(10): 65-68 (EI02256980629)
10. 宋蓄, 杨献勇, 罗锐, 王洲. 泡状流运动的湍流模型及液相速度和湍动能的分布预测. *工程热物理学报*, 20(6): 750-753, 1999 (EI 00045123559)
11. 宋蓄, 罗锐, 杨献勇, 王洲. 垂直圆管内向上稀疏层流泡状流相分布的实验研究. *工程热物理学报*, 2001, 22(4): 492-495
12. 宋蓄, 杨小勇, 孙幸超, 陈昌和, 徐旭常. NO₂对中温干法脱硫反应影响的实验研究. *工程热物理学报*, 2002, 23(3): 388-390
13. 宋蓄, 何百磊, 杨小勇, 陈昌和, 徐旭常. 利用甲醇氧化烟气中NO的实验研究. *工程热物理学报*, 2003, 24(1): 145-148
14. 罗锐, 宋蓄, 杨献勇, 王洲. 非均匀尺寸气泡形成的层流泡状流. *中国科学(E辑)*, 2001, 31(1): 1-7
15. 宋蓄, 罗锐, 杨献勇, 王洲. 绝热层流泡状流运动的双流体模型. *化工学报*, 2001, 52(10): 902-906 (EI 02136902236)
16. Luo Rui, Song Qiang, Yang Xian-Yong, Wang Zhou. A three-dimensional photographic method for measurement of phase distribution in dilute bubble flow. *Exp. Fluid*, 2002, 32(1): 116-120 (SCI 516HM, EI02196944750)
17. 宋蓄, 柴森康裕, 西岡将輝, 定方正毅. 硝酸熱分解を利用したSO₂の気相酸化反応. 日本化工年会, 2003年3月
18. 姚瑶, 高翔, 宋蓄. 制备过程中水合时间对脱硫剂性能影响的实验研究. *南昌大学学报(工科版)*, 2002, 24(3): 91-93 (核心期刊编号: N,T-41)
19. Song Qiang, Koshi Mitsuo and Sadakata Masayoshi.. Investigation on Promising Additives for Simultaneous Oxidation of NO and SO₂ in Flue Gas by Numerical Simulation. *Chinese Journal of Chemical Engineering*, 2003, 11(5): 531-535 (SCI741VL, EI04118060845)
20. Song Qiang, Shibamori Yasumori, Mitsuo Koshi, Sadakata Masayoshi. Research on Homogeneous Oxidation of NO and SO₂ in Flue Gas by Chain Reactions. *Energy and Fuels*, 2003, 17(6): 1549-1553 (SCI746FB, EI 03507777375)
21. Song Qiang, Shibamori Yasumori, Nishioka Masateru, Sadakata Masayoshi. A new technique to simultaneously oxidize NO and SO₂ in flue gas. In: *Energy and Environment-Proceedings of International Conference on Energy and the Environment*, Dec. 11-13, 2003, Shanghai, China (EI 04258219083, ISTEPBAA59)
22. Song Qiang, Sadakata Masayoshi, Xu Xuchang. Exploiting of NOX' s Effect on Flue Gas Desulfurization Reaction. In: *Proceedings of 5th International Symposium on Coal Combustion*, Nov. 23-26, 2003, Nanjing, China (EI04428413132, ISTEP BY87W)
23. He Bailei, Song Qiang, Chen Changhe, Xu Xuchang. Investigations on Mechanism of Soot Formation during Combustion and Control of Soot Emission. In: *Proceedings of 5th International Symposium on Coal Combustion*, Nov. 23-26, 2003, Nanjing, China (EI04428413086, ISTEP BY87W)
24. Yang Xiaoyong, Song Qiang, Chen Changhe, Xu Xuchang. Experimental Research on NO₂' effect on Dry FGD Reaction at Medium Temperature. In: *Proceedings of 5th International Symposium on Coal Combustion*, Nov. 23-26, 2003, Nanjing, China (EI04428413089, ISTEP BY87W)
25. 宋蓄, 定方正毅, 越光男. 利用链式反应同步氧化烟气中NO和SO₂的研究. *工程热物理学报*, 2004, 25(2): 351-353

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26. 宋蓄, 定方正毅, 越光男. 干法烟气脱硫技术的改进方法. 清华大学学报, 2004, 44(11): 1548-1550 (EI05058821905)
27. He Bailei, Song Qiang, Xu Song, Yao Qiang. Dynamic analysis of diesel particle oxidation. In: Proceedings of the 5th Asia-Pacific Conference on Combustion, Jul. 17-20, 2005, Adelaide, Australia
28. Yang Xiaoyong, Song Qiang, Chen Changhe, Xu Xuchang. Experimental research and mechanism analysis of NO₂'s effect on dry FGD reaction at 250~500°C. In: Proceedings of the 5th Asia-Pacific Conference on Combustion, Jul. 17-20, 2005, Adelaide, Australia
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35. 杨小勇, 宋蓄, 陈昌和, 徐旭常. 250~350°C时NO对干法脱硫反应的影响. 清华大学学报, 2006, 46(2): 222-225 (EI06199868253)
36. 孟忠伟, 宋蓄, 姚强, 何百磊, 徐旭常. 壁流式过滤器捕捉微细颗粒过程的数值模拟. 清华大学学报, 2006, 46(5): 678-681 (EI063010029337)
37. 黄斌, 姚强, 赵海亮, 宋蓄, 由长福. 飞灰在单纤维上形成颗粒链的生长和形貌. 清华大学学报, 2006, 46(5): 662-665 (EI063010029333)
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39. 龙正伟, 姚强, 黄斌, 宋蓄. 用ELPI测量颗粒物的分级荷电量. 工程热物理学报, 2006, 27(2): 354-356
40. Song Qiang, He Bailei, Yao Qiang, Meng Zhongwei, Chen Changhe. The influence of diffusion on thermogravimetric analysis of carbon black oxidation. Energy and Fuels, 2006, 20(6): 1895-1900 (SCI085PH, EI064210176845)
41. He Bailei, Song Qiang, Yao Qiang, Meng Zhongwei, Chen Changhe. Influence of A- or B-site substitution on the activity of LaMnO₃ perovskite-type catalyst. In: Proceedings of the 6th Korea-China Workshop on Clean Energy Technology, Jul. 4-7, 2006, Busan, Korea. (ISTP179BB)
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44. 刘忠; 宋蓄; 姚强; 张利琴. O₂/CO₂燃烧技术及其污染物生成与控制. 华北电力大学学报, 2007, 34(1): 82-88
45. 何百磊, 宋蓄, 姚强, 孟忠伟, 陈昌和. 钙钛矿型催化剂催化氧化碳黑的活性分析. 中国电机工程学报, 2007, 27(2): 54-58 (EI071610557144)

46. 何百磊, 宋蕾, 姚强, 孟忠伟, 陈昌和. 制备条件对LaMnO₃催化氧化碳黑活性的影响. 清华大学学报, 2007, 47(2) : 210-214 (EI071610558163)
47. He Bailei, Song Qiang, Yao Qiang, Meng Zhongwei, Chen Changhe. Influences of A- or B-site substitution on the activity of LaMnO₃ perovskite-type catalyst in oxidation of diesel particle KOREAN JOURNAL OF CHEMICAL ENGINEERING, 2007, 24(3): 503-507 (SCI179BB, EI064210176845)
48. Tang Junshi, Song Qiang, He Bailei, Yao Qiang. Research on multi-peak phenomena of DTG curves in TGA. In: Proceedings of the 6th Asia-Pacific Conference on Combustion, May. 20-23, 2007, Nagoya, Japan
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50. Yang Xiaoyong, Song Qiang, Chen Changhe, Xu Xuchang. Experimental research and mechanism analysis of NO_x's effect on dry FGD reaction at 250~500°C. In: Proceedings of the 6th Asia-Pacific Conference on Combustion, May. 20-23, 2007, Nagoya, Japan
51. 何百磊, 宋蕾, 孟忠伟, 姚强, 陈昌和. NO_x对La_{1-x}Mn_xO₃催化氧化碳烟活性影响的研究. 内燃机学报, 2007, 25(5) : 409-413 (EI074410900166)
52. Liu Zhong, Song Qiang, Wang Hui, et al. Emission characteristics of inhalable particulate matter from pulverized coal-fired boiler. In: Proceedings of International Conference on Air Quality VI, 2007, Arlington, USA
53. 张小锋, 卓建坤, 宋蕾, 姚强. 燃烧过程中铅颗粒粒径分布的实验研究. 清华大学学报(自然科学版), Journal of Tsinghua University(Science and Technology), 2007, (8): 1347-1351 (EI073710810758)
54. 孟忠伟, 郭栋, 宋蕾, 姚强, 徐旭常. 壁流式柴油机颗粒过滤器捕集性能的实验研究. 工程热物理学报, 2008, 29(1): 171-173
55. 岳勇, 姚强, 宋蕾, 李水清, 王琿. 不同煤燃烧源排放的PM₁₀形态及重金属分布的对比研究. 中国电机工程学报, 2007, 27(35): 33-38
56. 王琿, 宋蕾, 姚强, 陈昌和. 电厂湿法脱硫系统对烟气中细颗粒物脱除作用的实验研究. 中国电机工程学报, 2008, 28(5): 1-7