

References

- [1] S. B. Kausley and A. B. Pandit, “Modelling of solid fuel stoves,” *Fuel*, no. 89, pp. 782–791, 2010.
- [2] M. Miltner, A. Makaruk, M. Harasek, and A. Friedl, “Computational fluid dynamic simulation of a solid biomass combustor: Modelling approaches,” *Clean Technol. Environ. Policy*, vol. 10, no. 2, pp. 165–174, 2008.
- [3] J. Chartier, P. Guernion, and I. Milo, “CFD modelling of municipal solid waste incineration,” in *Progress in Computational Fluid Dynamics 7*, 2007, pp. 19–24.
- [4] K. Jang, W. Han, and K. Y. Huh, “Simulation of moving-bed and fluidized-bed reactors by DPM and MPPIC in OpenFOAM,” in *11th OpenFOAM Workshop*, 2016.
- [5] J. F. Davidson and D. Harrison, *Fluidized particles*. Cambridge: Cambridge University Press, 1963.
- [6] S. N. Oka, *Fluidized Bed Combustion*, 1st ed. New York: Marcel Dekker, 2004.
- [7] C. Y. Wen and Y. H. Yu, “Mechanics of fluidization,” in *Chem. Eng. Prog. Symp. Ser.*, 1966, pp. 100–111.
- [8] C. G. Philippsen, A. C. F. Vilela, and L. D. Zen, “Fluidized bed modeling applied to the analysis of processes: Review and state of the art,” *J. Mater. Res. Technol.*, vol. 4, no. 2, pp. 208–216, 2015.
- [9] W. C. Yang, *Handbook of fluidization and fluid-particlesystems*. New York: Taylor & Francis, 2003.
- [10] D. Kunii and O. Levenspiel, *Fluidization engineering*. New York: Jonh Wiley, 1969.
- [11] C. E. J. van Lare, “Mass transfer in gasfluidized beds: scaling, modeling and particle size influence,” Technische Universiteit Eindhoven, 1991.

- [12] M. Mnndo, L. Rosendahl, C. Yin, and H. Sorensen, “Pulverized straw combustion in a low-NO_x multifuel burner: Modeling the transition from coal to straw,” *Fuel*, no. 89, pp. 3051–3062, 2010.
- [13] The OpenFOAM Foundation, “OpenFOAM dev,” 2018. [Online]. Available: <https://cpp.openfoam.org/dev/>. [Accessed: 11-Dec-2018].
- [14] J. K. A. T. Rajika and M. Narayana, “Modelling and simulation of wood chip combustion in a hot air generator system,” *Springerplus*, vol. 5, no. 1, p. 1166, 2016.
- [15] A. Berlemont, P. Achim, and Z. Chang, “Lagrangian approaches for particle collisions: The colliding particle velocity correlation in the multiple particles tracking method and in the stochastic approach,” *Phys. Fluids*, vol. 13, no. 10, pp. 2946–2956, 2001.
- [16] X. Wang, B. Jin, and W. Zhong, “Three-dimensional simulation of fluidized bed coal gasification,” *Chem. Eng. Process. Process Intensif.*, vol. 48, no. 2, pp. 695–705, 2009.
- [17] S. Elghobashi, “On predicting particle-laden turbulent flows,” *Appl. Sci. Res.*, vol. 52, no. 4, pp. 309–329, 1994.
- [18] M. J. Anderews and P. J. O’Rourke, “The multiphase particle-in-cell (MP-PIC) method for dense particulate flows,” *Int. J. Multiph. Flow*, vol. 22, no. 2, pp. 379–402, 1996.
- [19] S. Benzarti, H. Mhiri, and H. Bournot, “Drag models for Simulation Gas-Solid Flow in the Bubbling Fluidized Bed of FCC Particles,” *Waset.Org*, vol. 61, no. 1, pp. 1138–1143, 2012.
- [20] S. Ergun, “Fluid flow through packed columns,” *Chem. Eng. Prog.*, vol. 48, pp. 89–94, 1952.
- [21] H. K. Versteeg and W. Malalasekera, *An Introduction to Computational Fluid Dynamics*, 2nd ed. Essex: Prentice Hall, 2007.
- [22] T. Poinsot and D. Veynante, *Theoretical and Numerical Combustion*, 2nd ed.

PA,USA: Edwards Inc, 2005.

- [23] M. Bellais, “Modelling of the pyrolysis of large wood particles,” KTH - Royal Institute of Technology, 2007.
- [24] S. Gerber, M. Oevermann, and F. Behrendt, “An Euler-Lagrange modeling approach for the simulation of wood gasification in fluidized beds,” in *4th European Combustion Meeting*, 2009, pp. 1–6.
- [25] N. Prakash and T. Karunanithi, “Kinetic modeling in biomass pyrolysis - a review,” *Appl. Sci. Res.*, vol. 4, no. 12, pp. 1627–1636, 2008.
- [26] H. Lu, W. Robert, G. Peirce, B. Ripa, and L. L. Baxter, “Comprehensive study of biomass particle combustion,” *Energy and Fuels*, vol. 22, no. 4, pp. 2826–2839, 2008.
- [27] H. Thunman, F. Niklasson, F. Johnsson, and B. Leckner, “Composition of volatile gases and thermochemical properties of wood for modeling of fixed or fluidized beds,” *Energy and Fuels*, vol. 15, no. 6, pp. 1488–1497, 2001.
- [28] S. Sinha, A. Jhalani, M. R. Ravi, and A. Ray, “Modeling of pyrolysis in wood: a review,” *SESI*, vol. 1, no. 10, pp. 41–62, 2000.
- [29] N. Abani and A. F. Ghoniem, “Large eddy simulation of coal gasification in an entrained flow gasifier,” *Fuel*, no. 104, pp. 664–680, 2013.
- [30] D. M. Christ, “The Effect of Char Kinetics on the Combustion of Pulverized Coal under Oxyfuel Conditions,” Dissertation, RWTH Aachen University, 2013.
- [31] K. L. Smith, L. D. Smoot, T. H. Fletcher, and R. J. Pugmire, *The structure and reaction processes of coal*. N: Springer International Publishing, 1994.
- [32] T. Jurena, “Numerical Modelling of Grate Combustion,” Dissertation, Brno University of Technology, 2012.
- [33] Y. Haseli, J. A. van Oijen, and L. P. H. de Goey, “A detailed one-dimensional model of combustion of a woody biomass particle,” *Bioresour. Technol.*, vol.

- 102, no. 20, pp. 9772–9782, 2011.
- [34] N. Fernando and M. Narayana, “A comprehensive two dimensional Computational Fluid Dynamics model for an updraft biomass gasifier,” *Renew. Energy*, vol. 99, pp. 698–710, 2016.
- [35] R. E. Treybal, *Mass-Transfer operations*, 3rd ed. Singapore: McGraw-Hill, 1981.
- [36] M. Frenklach, T. Bowman, and G. Smith, “GRI-Mech,” *Gas Technology Institute (GTI)*. [Online]. Available: <http://combustion.berkeley.edu/gri-mech/index.htm>.
- [37] S. V. Patankar, *Numerical Heat Transfer and Fluid Flow*. USA: Taylor & Francis, 1980.
- [38] H. Liu, “CFD Modeling of Biomass Gasification Using a Circulating Fluidized Bed Reactor,” Dissertation, University of Waterloo, 2014.
- [39] J. Kramb, J. Konttinen, A. Gómez-Barea, A. Moilanen, and K. Umeki, “Modeling biomass char gasification kinetics for improving prediction of carbon conversion in a fluidized bed gasifier,” *Fuel*, vol. 132, pp. 107–115, 2014.
- [40] M. Kumar and A. F. Ghoniem, “Multiphysics simulations of entrained flow gasification. Part I: Validating the Nonreacting Flow Solver and the Particle Turbulent Dispersion Model,” *Energy Fuels*, vol. 26, no. 1, pp. 464–479, 2012.
- [41] J. Sodja, “Turbulence models in CFD,” University of Ljubljana, 2007.
- [42] H. E. Tahry, “k- ϵ Equation for Compressible Reciprocating Engine Flows.pdf,” *Energy*, vol. 7, pp. 345–353, 1983.
- [43] P. Spalart, “The uses of DES: natural, extended and improper,” 2005.
- [44] M. L. Shur, P. R. Spalart, M. K. Strelets, and A. K. Travin, “An Enhanced Version of DES with Rapid Transition from RANS to LES in Separated

- Flows,” *Flow, Turbul. Combust.*, vol. 95, no. 4, pp. 709–737, Dec. 2015.
- [45] S. Gomez, “Changes and Settings for Standard Turbulence Model Implementation in OpenFOAM,” New Mexico, 2006.
- [46] F. R. Menter, M. Kuntz, and R. Langtry, “Ten Years of Industrial Experience with the SST Turbulence Model,” *Turbul. Heat Mass Transf.* 4, vol. 4, pp. 625–632, 2003.
- [47] A. P. Robinson, H. C. Coote, and P. Reupke, “Report on a Visit to Sri Lanka to carry-out a techno-economic appraisal of the NRI rice husk burner in collaboration with the Rice Processing Research and Development Centre,” UK, 1991.
- [48] X. Ku, T. Li, and T. Løvås, “CFD-DEM simulation of biomass gasification with steam in a fluidized bed reactor,” *Chem. Eng. Sci.*, vol. 122, pp. 270–283, 2015.
- [49] Y. Tsuji, T. Kawaguchi, and T. Tanaka, “Discrete particle simulation of two-dimensional fluidized bed,” *Powder Technol.*, vol. 77, no. 1, pp. 79–87, 1993.
- [50] B. H. Xu and A. B. Yu, “Numerical simulation of the gas-solid flow in a fluidized bed by combining discrete particle method with computational fluid dynamics,” *Chem. Eng. Sci.*, vol. 52, no. 16, pp. 2785–2809, 1997.
- [51] T. Song, J. Wu, L. Shen, and J. Xiao, “Experimental investigation on hydrogen production from biomass gasification in interconnected fluidized beds,” *Biomass and Bioenergy*, vol. 36, pp. 258–267, 2012.
- [52] D. G. C. Wickramasinghe, M. Narayana, and A. D. U. S. Amarasinghe, “Eulerian-Lagrangian Approach for Modeling of Biomass Fluidized Bed Combustion,” in *Vidulka: National Energy Symposium*, 2017, pp. 209–213.

Appendix A: Publications

1. D. G. C Wickramasinghe, M. Narayana, and A. D. U. S. Amarasinghe, “Numerical Simulation of Suspension Biomass Combustor with Two Chambers,” in *2018 Moratuwa Engineering Research Conference (MERCon)*, Moratuwa, 2018, pp. 226–230. doi: 10.1109/MERCon.2018.8421947, <https://ieeexplore.ieee.org/abstract/document/8421947/>
2. D. G. C Wickramasinghe, M. Narayana, and A. D. U. S. Amarasinghe, “Eulerian-Lagrangian Approach for Modeling of Biomass Fluidized Bed Combustion,” in *Vidulka: National Energy Symposium*, SL, 2017, pp. 209–213.