REFERENCES

[1] C. A. Biltoft, "Customer report for mock urban setting test," *DPG Document*, no. 8-CO, pp. 160–000, 2001.

[2] WeMEP. (2014) The Askervein Isolated Smooth Hill (Askervein) kernel description. [Online]. Available: https://wemep.readthedocs.io/en/latest/windconditions/benchmarks/askervein.html

[3] M. LLC. (1999) MS Windows NT kernel description. [Online]. Available: https://wemep.readthedocs.io/en/latest/windconditions/benchmarks/askervein.html

[4] H. D. S. Premasiri, I. Samarasinghe, and K. M. N. Lakmali, "Population exposure risk assessment to air pollution in kandy city area," 2012.

[5] W. H. Organization *et al.*, "Air pollution and child health: prescribing clean air: summary," World Health Organization, Tech. Rep., 2018.

[6] J. Sinha, "Mortality and air pollution effects of air quality interventions in delhi and beijing," *Frontiers in Environmental Science*, vol. 7, p. 15, 02 2019.

[7] P. K. Hopke, D. D. Cohen, B. A. Begum, S. K. Biswas, B. Ni, G. G. Pandit, M. Santoso, Y.-S. Chung, P. Davy, A. Markwitz *et al.*, "Urban air quality in the asian region," *Science of the Total Environment*, vol. 404, no. 1, pp. 103–112, 2008.

[8] W. H. Organization *et al.*, "Ambient air pollution: A global assessment of exposure and burden of disease," 2016.

[9] G. Fisher, K. Rolfe, T. Kjellstrom, A. Woodward, S. Hales, A. Sturman, S. Kingham, J. Petersen, R. Shrestha, and D. King, "Health effects due to motor vehicle air pollution in new zealand," *Wellington: Ministry of Transport*, 2002.

[10] A. Hajat, R. F. MacLehose, A. Rosofsky, K. D. Walker, and J. E. Clougherty, "Confounding by socioeconomic status in epidemiological studies of air pollution and health: challenges and opportunities," *Environmental health perspectives*, vol. 129, no. 6, p. 065001, 2021.

[11] B. Zou, J. G. Wilson, F. B. Zhan, and Y. Zeng, "Air pollution exposure assessment methods utilized in epidemiological studies," *Journal of Environmental Monitoring*, vol. 11, no. 3, pp. 475–490, 2009.

[12] O. Ileperuma, "Review of air pollution studies in sri lanka," *Ceylon Journal of Science*, vol. 49, no. 3, p. 225, 2020.

[13] U. of Moratuwa in association with the University of Peradeniya Sri Lanka, "Kandy city transport study," https://kumarage.files.wordpress.com/2015/03/2011-ucr-1-ut-kandy-city-transport-study-rda-123pp.pdf.

[14] M. Elangasinghe and R. Shanthini, "Determination of atmospheric pm 10 concentration in kandy in relation to traffic intensity," *Journal of the National Science Foundation of Sri Lanka*, vol. 36, no. 3, 2008.

[15] S. Y. Bandara, "The health cost of urban air pollution in sri lanka: An empirical analysis in the city of kandy muditha karunarathna wasantha athukorala 2," *vi Editor's Note 1 Free Trade Agreements and Trade Expansion: Rhetoric and Reality*, vol. 2, no. 1, p. 75, 2019.

[16] P. Ahlvik, S. Eggleston, N. Gorissen, D. Hassel, A. Hickman, R. Joumard, L. Ntziachristos, R. Rijkeboer, Z. Samaras, and K. Zierock, "Copert ii computer programme to calculate emissions from road transport: methodology and emission factors," *European Environment Agency, Copenhagen*, 1997.

[17] O. Ileperuma and V. D. Abeyratne, "Monitoring air pollution levels in kandy using passive and active gas sampling techniques," 2002.

[18] A. Wickramasinghe, D. Karunaratne, and R. Sivakanesan, "Pm10-bound polycyclic aromatic hydrocarbons: Concentrations, source characterization and estimating their risk in urban, suburban and rural areas in kandy, sri lanka," *Atmospheric Environment*, vol. 45, no. 16, pp. 2642–2650, 2011.

[19] A. Pitawala, D. Herath, and N. Piyatunga, "Chemical characterization of household dust in two major cities: Colombo, the capital and kandy, the hill capital, sri lanka," *Carpathian Journal of Earth and Environmental Sciences*, vol. 8, no. 2, pp. 89–95, 2013.

[20] L. Ntziachristos, D. Gkatzoflias, C. Kouridis, and Z. Samaras, "Copert: a european road transport emission inventory model," in *Information Technologies in Environmental Engineering: Proceedings of the 4th International ICSC Symposium Thessaloniki, Greece, May 28-29, 2009*. Springer, 2009, pp. 491–504.

[21] H. Abou-Senna, E. Radwan, K. Westerlund, and C. D. Cooper, "Using a traffic simulation model (vissim) with an emissions model (moves) to predict emissions from vehicles on a limited-access highway," *Journal of the Air & Waste Management Association*, vol. 63, no. 7, pp. 819–831, 2013.

[22] N. Davis, J. Lents, M. Osses, N. Nikkila, and M. Barth, "Development and application of an international vehicle emissions model," *Transportation Research Record*, vol. 1939, no. 1, pp. 156–165, 2005.

[23] J. Zheng, L. Zhang, W. Che, Z. Zheng, and S. Yin, "A highly resolved temporal and spatial air pollutant emission inventory for the pearl river delta region, china and its uncertainty assessment," *Atmospheric Environment*, vol. 43, no. 32, pp. 5112–5122, 2009.

[24] H. Wang, L. Fu, Y. Zhou, X. Du, and W. Ge, "Trends in vehicular emissions in china's mega cities from 1995 to 2005," *Environmental Pollution*, vol. 158, no. 2, pp. 394–400, 2010.

[25] R.-J. Wang, K. Wang, F. Zhang, J.-J. Gao, Y. Li, and T. Yue, "Emission characteristics of vehicles from national roads and provincial roads in china," *Huan Jing ke Xue= Huanjing Kexue*, vol. 38, no. 9, pp. 3553–3560, 2017.

[26] S. Fan, L. Tian, D. Zhang, and S. Qu, "Emission characteristics of vehicle exhaust in beijing based on actual traffic flow information," *Huan Jing ke Xue= Huanjing Kexue*, vol. 36, no. 8, pp. 2750–2757, 2015.

[27] C. Gómez, C. González, M. Osses, and B. Aristizábal, "Spatial and temporal disaggregation of the on-road vehicle emission inventory in a medium-sized andean city. comparison of gis-based top-down methodologies," *Atmospheric environment*, vol. 179, pp. 142–155, 2018.

[28] K. WANG, Y. TONG, T. CAO, C. WANG, R. WANG, J. GAO, and Y. LIU, "Vehicle emissions calculation for urban roads based on the macroscopic fundamental diagram method and real-time traffic information," *Atmospheric and Oceanic Science Letters*, vol. 13, no. 2, pp. 89–96, 2020.

[29] R. Singh, C. Sharma, and M. Agrawal, "Emission inventory of trace gases from road transport in india," *Transportation Research Part D: Transport and Environment*, vol. 52, pp. 64–72, 2017. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1361920915300122

[30] P. Goyal, D. Mishra, and A. Kumar, "Vehicular emission inventory of criteria pollutants in delhi," *SpringerPlus*, vol. 2, no. 1, pp. 1–11, 2013.

[31] T. Alam and A. Shukla, "Vehicular emission inventory of lucknow," in *Advances in Civil Engineering and Infrastructural Development*. Springer, 2021, pp. 469–477.

[32] R. Jaikumar, S. S. Nagendra, and R. Sivanandan, "Modeling of real time exhaust emissions of passenger cars under heterogeneous traffic conditions," *Atmospheric Pollution Research*, vol. 8, no. 1, pp. 80–88, 2017.

[33] N. K. Rai, A. Vyas, and S. Singh, "Street level modeling of pollutants for residential areas," *International Journal of Engineering Research and Application*, vol. 7, no. 10, pp. 52–57, 2017.

[34] H. Kataoka, Y. Ono, and K. Enoki, "Applications and prospects of cfd for wind engineering fields," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 205, p. 104310, 2020.

[35] Y. Tominaga, A. Mochida, R. Yoshie, H. Kataoka, T. Nozu, M. Yoshikawa, and T. Shirasawa, "Aij guidelines for practical applications of cfd to pedestrian wind environment around buildings," *Journal of wind engineering and industrial aerodynamics*, vol. 96, no. 10-11, pp. 1749–1761, 2008.

[36] Y. Tominaga and T. Stathopoulos, "Cfd simulation of near-field pollutant dispersion in the urban environment: A review of current modeling techniques," *Atmospheric Environment*, vol. 79, pp. 716–730, 2013.

[37] M. Chavez, B. Hajra, T. Stathopoulos, and A. Bahloul, "Near-field pollutant dispersion in the built environment by cfd and wind tunnel simulations," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 99, no. 4, pp. 330–339, 2011.

[38] P.-Y. Cui, Z. Li, and W.-Q. Tao, "Buoyancy flows and pollutant dispersion through different scale urban areas: Cfd simulations and wind-tunnel measurements," *Building and Environment*, vol. 104, pp. 76–91, 2016.

[39] B. Blocken, "Computational fluid dynamics for urban physics: Importance, scales, possibilities, limitations and ten tips and tricks towards accurate and reliable simulations," *Building and Environment*, vol. 91, pp. 219–245, 2015.

[40] N. Antoniou, H. Montazeri, M. Neophytou, and B. Blocken, "Cfd simulation of urban microclimate: Validation using high-resolution field measurements," *Science of the total environment*, vol. 695, p. 133743, 2019.

[41] P. Piroozmand, G. Mussetti, J. Allegrini, M. H. Mohammadi, E. Akrami, and J. Carmeliet, "Coupled cfd framework with mesoscale urban climate model: Application to microscale urban flows with weak synoptic forcing," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 197, p. 104059, 2020.

[42] M. Pantusheva, R. Mitkov, P. O. Hristov, and D. Petrova-Antonova, "Air pollution dispersion modelling in urban environment using cfd: A systematic review," *Atmosphere*, vol. 13, no. 10, p. 1640, 2022.

[43] B. Blocken, A. van der Hout, J. Dekker, and O. Weiler, "Cfd simulation of wind flow over natural complex terrain: Case study with validation by field measurements for ria de ferrol, galicia, spain," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 147, pp. 43–57, 2015.

[44] B. Blocken, J. Carmeliet, and T. Stathopoulos, "Cfd evaluation of wind speed conditions in passages between parallel buildings—effect of wall-function roughness modifications for the atmospheric boundary layer flow," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 95, no. 9-11, pp. 941–962, 2007.

[45] Y. Toparlar, B. Blocken, B. Maiheu, and G. van Heijst, "Cfd simulation of the near-neutral atmospheric boundary layer: New temperature inlet profile consistent with wall functions," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 191, pp. 91–102, 2019.

[46] R. K. Bani, "Validation of atmospheric boundary layer cfd simulation of a generic isolated cube: Basic settings for urban flows," in *Proceedings of the 3rd IBPSA-England Conference BSO, Newcastle, UK*, 2016, pp. 12–14.

[47] Á. Leelőssy, F. Molnár, F. Izsák, Á. Havasi, I. Lagzi, and R. Mészáros, "Dispersion modeling of air pollutants in the atmosphere: a review," *Open Geosciences*, vol. 6, no. 3, pp. 257–278, 2014.

[48] P. Gousseau, B. Blocken, T. Stathopoulos, and G. Van Heijst, "Cfd simulation of near-field pollutant dispersion on a high-resolution grid: a case study by les and rans for a building group in downtown montreal," *Atmospheric Environment*, vol. 45, no. 2, pp. 428–438, 2011.

[49] Y. Tominaga and T. Stathopoulos, "Cfd modeling of pollution dispersion in building array: evaluation of turbulent scalar flux modeling in rans model using les results," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 104, pp. 484–491, 2012.

[50] R. B. Stull, *An introduction to boundary layer meteorology*. Springer Science & Business Media, 1988, vol. 13.

[51] E. Leblebici, "Unsteady atmospheric flow solutions with openfoam coupled with the numerical weather prediction software, wrf," 2018.

[52] T. Oke and H. Cleugh, "Urban heat storage derived as energy balance residuals," *Boundary-Layer Meteorology*, vol. 39, no. 3, pp. 233–245, 1987.

[53] B. W. Atkinson, *Meso-scale atmospheric circulations*. Academic press New York, 1989, vol. 495.

[54] C. D. Whiteman and J. C. Doran, "The relationship between overlying synoptic-scale flows and winds within a valley," *Journal of Applied Meteorology and Climatology*, vol. 32, no. 11, pp. 1669–1682, 1993.

[55] S. Finardi, M. Morselli, P. Jeannet *et al.*, "Wind flow models over complex terrain for dispersion calculations," in *Cost Action*, vol. 710, 1997, p. 51.

[56] C. J. Greenshields, "Openfoam user guide version 6," *The OpenFOAM Foundation*, p. 237, 2018.

[57] M. Garcia and P. Boulanger, "Low altitude wind simulation over mount saint helens using nasa srtm digital terrain model," in *Third International Symposium on 3D Data Processing, Visualization, and Transmission (3DPVT'06)*. IEEE, 2006, pp. 535–542.

[58] F. Flores, R. Garreaud, and R. C. Muñoz, "Openfoam applied to the cfd simulation of turbulent buoyant atmospheric flows and pollutant dispersion inside large open pit mines under intense insolation," *Computers & Fluids*, vol. 90, pp. 72–87, 2014.

[59] D. Elfverson and C. Lejon, "Use and scalability of openfoam for wind fields and pollution dispersion with building-and ground-resolving topography," *Atmosphere*, vol. 12, no. 9, p. 1124, 2021.

[60] M. Balogh, A. Parente, and C. Benocci, "Rans simulation of abl flow over complex terrains applying an enhanced k-ε model and wall function formulation: Implementation and comparison for fluent and openfoam," *Journal of wind engineering and industrial aerodynamics*, vol. 104, pp. 360–368, 2012.

[61] H. K. Versteeg and W. Malalasekera, *An introduction to computational fluid dynamics: the finite volume method*. Pearson education, 2007.

[62] N. D. Cardwell, P. P. Vlachos, and K. A. Thole, "Developing and fully developed turbulent flow in ribbed channels," *Experiments in fluids*, vol. 50, no. 5, pp. 1357–1371, 2011.

[63] H. Wang, N. Nikitin, and S. Chernyshenko, "Identification of a laminar-turbulent interface in partially turbulent flow," *Fluid Dynamics*, vol. 46, no. 6, pp. 911–916, 2011.

[64] W. Bachman, W. Sarasua, S. Hallmark, and R. Guensler, "Modeling regional mobile source emissions in a geographic information system framework," *Transportation Research Part C: Emerging Technologies*, vol. 8, no. 1-6, pp. 205–229, 2000.

[65] L. Xia and Y. Shao, "Modelling of traffic flow and air pollution emission with application to hong kong island," *Environmental Modelling & Software*, vol. 20, no. 9, pp. 1175–1188, 2005.

[66] A. Abbasi, F. O. Annor, and N. van de Giesen, "The effects of small water surfaces on turbulent flow in the atmospheric boundary layer: Urans approach implemented in openfoam," *Environmental Modelling & Software*, vol. 101, pp. 268–288, 2018.

[67] A. Bechmann, "Large-eddy simulation of atmospheric flow over complex terrain," 2006.

[68] C. Gromke and B. Blocken, "Influence of avenue-trees on air quality at the urban neighborhood scale. part i: Quality assurance studies and turbulent schmidt number analysis for rans cfd simulations," *Environmental Pollution*, vol. 196, pp. 214–223, 2015. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0269749114004394

[69] R. Longo, A. Bellemans, M. Derudi, and A. Parente, "A multi-fidelity framework for the estimation of the turbulent schmidt number in the simulation of atmospheric dispersion," *Building and Environment*, vol. 185, p. 107066, 2020. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0360132320304467

[70] A. Rahimi, T. Tavakoli, and S. Zahiri, "Computational fluid dynamics (cfd) modeling of gaseous pollutants dispersion in low wind speed condition: Isfahan refinery, a case study," *Petroleum science and technology*, vol. 32, no. 11, pp. 1318–1326, 2014.

[71] M. Chavez, B. Hajra, T. Stathopoulos, and A. Bahloul, "Assessment of near-field pollutant dispersion: Effect of upstream buildings," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 104-106, pp. 509–515, 2012, 13th International Conference on Wind Engineering. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0167610512000438

[72] S. Silvester, I. Lowndes, and D. Hargreaves, "A computational study of particulate emissions from an open pit quarry under neutral atmospheric conditions," *Atmospheric Environment*, vol. 43, no. 40, pp. 6415–6424, 2009.

[73] B. Martinez, "Wind resource in complex terrain with openfoam. risø dtu (technical university of denmark)," 2011.

[74] R. Nuterman, A. Starchenko, and A. Baklanov, "Numerical model of urban aerodynamics and pollution dispersion," *International Journal of Environment and Pollution*, vol. 44, no. 1-4, pp. 385–393, 2011.

[75] J. C. Chang and S. R. Hanna, "Air quality model performance evaluation," *Meteorology and Atmospheric Physics*, vol. 87, no. 1, pp. 167–196, 2004.

[76] M. L. Bahlali, E. Dupont, and B. Carissimo, "Atmospheric dispersion using a lagrangian stochastic approach: Application to an idealized urban area under neutral and stable meteorological conditions," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 193, p. 103976, 2019.

[77] F. Flores, R. Garreaud, and R. C. Muñoz, "Cfd simulations of turbulent buoyant atmospheric flows over complex geometry: solver development in openfoam," *Computers & Fluids*, vol. 82, pp. 1–13, 2013.

[78] P. Richards and R. Hoxey, "Appropriate boundary conditions for computational wind engineering models using the k- turbulence model," *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 46-47, pp. 145–153, 1993, proceedings of the 1st International on Computational Wind Engineering. [Online]. Available: https://www.sciencedirect.com/science/article/pii/0167610593901247

[79] S. Inparaja and M. Narayana, "Development of a numerical model for pollutant dispersion over 3d building array," in *2022 Moratuwa Engineering Research Conference (MERCon)*, 2022, pp. 1–6.

[80] R. S. Arthur, K. A. Lundquist, D. J. Wiersema, J. Bao, and F. K. Chow, "Evaluating implementations of the immersed boundary method in the weather research and forecasting model," *Monthly Weather Review*, vol. 148, no. 5, pp. 2087 – 2109, 2020. [Online]. Available: https://journals.ametsoc.org/view/journals/mwre/148/5/mwr-d-19-0219.1.xml

[81] F. K. Chow and R. L. Street, "Evaluation of turbulence closure models for large-eddy simulation over complex terrain: Flow over askervein hill," *Journal of Applied Meteorology and Climatology*, vol. 48, no. 5, pp. 1050 – 1065, 2009. [Online]. Available: https://journals.ametsoc.org/view/journals/apme/48/5/2008jamc1862.1.xml

[82] N. S. Wagenbrenner, J. M. Forthofer, W. G. Page, and B. W. Butler, "Development and evaluation of a reynolds-averaged navier–stokes solver in windninja for operational wildland fire applications," *Atmosphere*, vol. 10, no. 11, 2019. [Online]. Available: https://www.mdpi.com/2073-4433/10/11/672

[83] P. A. Taylor, P. J. Mason, and E. F. Bradley, "Boundary-layer flow over low hills," *Boundary-layer meteorology*, vol. 39, no. 1, pp. 107–132, 1987.

[84] B. Blocken, T. Stathopoulos, and J. Carmeliet, "Cfd simulation of the atmospheric boundary layer: wall function problems," *Atmospheric Environment*, vol. 41, no. 2, pp. 238–252, 2007. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S135223100600834X

[85] A. Bechmann, N. Sørensen, and J. Johansen, "Atmospheric flow over terrain using hybrid rans/les," in *Proceedings of The European Wind Energy Conference and Exhibition, EWEC 2007*. The European Wind Energy Association, 2007, pp. 64–67.

[86] A. Silva Lopes, J. Palma, and F. Castro, "Simulation of the askervein flow. part 2: Large-eddy simulations," *Boundary-Layer Meteorology*, vol. 125, no. 1, pp. 85–108, 2007.

[87] M. Elangasinghe and R. Shanthini, "Determination of atmospheric pm 10 concentration in kandy in relation to traffic intensity," 11 2008.

[88] X. Fu, S. Xiang, Y. Liu, J. Liu, J. Yu, D. L. Mauzerall, and S. Tao, "High-resolution simulation of local traffic-related nox dispersion and distribution in a complex urban terrain," *Environmental Pollution*, vol. 263, p. 114390, 2020. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0269749119344458