

## References

- Abuseada, M., Ozalp, N., and Ophoff, C. (2019). Numerical and experimental investigation of heat transfer in a solar receiver with a variable aperture. *International Journal of Heat and Mass Transfer*, 128, 125-135.
- Achenbach, T., Geimer, K., Götsche, J., Hoffschmidt, B., Lynen, A., and Bauer, J. (2011). Simulation and flow measurements of volumetric high temperature absorbers for solar tower power plants. In *SolarPACES 2011 : concentrating solar power and chemical energy systems : 20 - 23 September, 2011, Granada, Spain*.
- Agrafiotis, C. C., Mavroidis, I., Konstandopoulos, A. G., Hoffschmidt, B., Stobbe, P., Romero, M., and Fernandez-Quero, V. (2007). Evaluation of porous silicon carbide monolithic honeycombs as volumetric receivers/collectors of concentrated solar radiation. *Solar Energy Materials and Solar Cells*, 91(6), 474-488.
- Ahlbrink, N., Andersson, J., Diehl, M., and Pitz-Paal, R. (2010, September). Optimized operation of an open volumetric air receiver. In *Proceedings of the Solar-PACES 2010 Conference, Perpignan, France, September* (pp. 21-24).
- Asif, M. (2017). Fundamentals and application of solar thermal technologies. Reference Module in Earth Systems and Environmental Sciences, *Encyclopedia of Sustainable Technologies*, 27-36.
- Astarita, G., and Greco, G. (1968). Excess pressure drop in laminar flow through sudden contraction. Newtonian liquids. *Industrial & Engineering Chemistry Fundamentals*, 7(1), 27-31.
- Ávila-Marín, A. L. (2011). Volumetric receivers in solar thermal power plants with central receiver system technology: a review. *Solar Energy*, 85(5), 891-910.
- Ávila-Marín, A. L., Alvarez-Lara, M., and Fernandez-Reche, J. (2014). Experimental results of gradual porosity wire mesh absorber for volumetric receivers. *Energy Procedia*, 49, 275-283.
- Baharoon, D. A., Rahman, H. A., Omar, W. Z. W., and Fadhl, S. O. (2015). Historical development of concentrating solar power technologies to generate clean electricity efficiently- A review. *Renewable and Sustainable Energy Reviews*, 41, 996-1027.
- Bai, F. (2010). One dimensional thermal analysis of silicon carbide ceramic foam used for solar air receiver. *International Journal of Thermal Sciences*, 49(12), 2400-2404.
- Barreto, G., Canhoto, P., and Collares-Pereira, M. (2018). Three-dimensional modelling and analysis of solar radiation absorption in porous volumetric receivers. *Applied Energy*, 215, 602-614.
- Becker, M., and Vant-Hull, L. L. (1991). Thermal receivers. In *Solar Power Plants* (pp. 163-198). Springer, Berlin, Heidelberg.
- Becker, M., Fend, T., Hoffschmidt, B., Pitz-Paal, R., Reutter, O., Stamatov, V., Steven, M. and Trimis, D. (2006). Theoretical and numerical investigation of flow stability in porous materials applied as volumetric solar receivers. *Solar Energy*, 80(10), 1241-1248.
- Behar, O., Khellaf, A., and Mohammedi, K. (2013). A review of studies on central receiver solar thermal power plants. *Renewable and Sustainable Energy Reviews*, 23, 12-39.
- Bijarniya, J. P., Sudhakar, K., and Baredar, P. (2016). Concentrated solar power technology in India: a review. *Renewable and Sustainable Energy Reviews*, 63, 593-603.
- Bishoyi, D., and Sudhakar, K. (2017). Modeling and performance simulation of 100 MW PTC based solar thermal power plant in Udaipur India. *Case Studies in Thermal Engineering*, 10, 216-226.
- Boehmer, M., Becker, M., and Sánchez, M. (1991, August). Development of volumetric air receivers. In *Proceedings of the Biennial Congress of ISES. Denver, CO, USA: Pergamon Press* (pp. 2123-2128).
- Cagnoli, M., Savoldi, L., Zanino, R., and Zaversky, F. (2017). Coupled optical and CFD parametric analysis of an open volumetric air receiver of honeycomb type for central tower CSP plants. *Solar Energy*, 155, 523-536.

Capuano, R., Fend, T., Hoffschmidt, B., and Pitz-Paal, R. (2015, November). Innovative volumetric solar receiver micro-design based on numerical predictions. In *ASME 2015 International Mechanical Engineering Congress and Exposition* (pp. V08BT10A005-V08BT10A005). American Society of Mechanical Engineers.

Capuano, R., Fend, T., Stadler, H., Hoffschmidt, B. and Pitz-Paal, R. (2017). Optimized volumetric solar receiver: Thermal performance prediction and experimental validation. *Renewable Energy*, 114, 556-566.

Casal, J. and Martinez-Benet, J. M., (1983). A better way to calculate cyclone pressure drop. *Chem. Eng.*, 90-99.

Coker, A. K. (1993). Understand cyclone design. *Chemical Engineering Progress;(United States)*, 89(12).

Dirgo, J., and Leith, D. (1985). Cyclone collection efficiency: comparison of experimental results with theoretical predictions. *Aerosol Science and Technology*, 4(4), 401-415.

Edouard, D., Lacroix, M., Huu, C. P., and Luck, F. (2008). Pressure drop modeling on SOLID foam: State-of-the art correlation. *Chemical Engineering Journal*, 144(2), 299-311.

Ergun, S. (1952). Fluid flow through packed columns. *Chem. Eng. Prog.*, 48, 89-94.

Fend, T. (2010). High porosity materials as volumetric receivers for solar energetics. *Opt. Appl*, 40(2), 271-284.

Fend, T., Hoffschmidt, B., Pitz-Paal, R., Reutter, O., and Rietbrock, P. (2004). Porous materials as open volumetric solar receivers: experimental determination of thermophysical and heat transfer properties. *Energy*, 29(5-6), 823-833.

Fend, T., Pitz-Paal, R., Hoffschmidt, B. and Reutter, O., (2005). Solar radiation conversion, In: Scheffler, M., P. Colombo, P. (Eds.), *Cellular Ceramics: Structure, Manufacturing, Properties and Applications*, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, pp.523-546.

Fend, T., Schwarzbözl, P., Smirnova, O., Schöllgen, D., and Jakob, C. (2013). Numerical investigation of flow and heat transfer in a volumetric solar receiver. *Renewable Energy*, 60, 655-661.

Gimbun, J., Chuah, T. G., Fakhru'l-Razi, A., and Choong, T. S. (2005). The influence of temperature and inlet velocity on cyclone pressure drop: a CFD study. *Chemical Engineering and Processing: Process Intensification*, 44(1), 7-12.

Gómez-García, F., González-Aguilar, J., Olalde, G. and Romero, M. (2016). Thermal and hydrodynamic behavior of ceramic volumetric absorbers for central receiver solar power plants: A review. *Renewable and Sustainable Energy Reviews*, 57, 648-658.

Gomez-Garcia, F., Gonzalez-Aguilar, J., Tamayo-Pacheco, S., Olalde, G., and Romero, M. (2015). Numerical analysis of radiation propagation in a multi-layer volumetric solar absorber composed of a stack of square grids. *Solar Energy*, 121, 94-102.

Grimison, E. D., (1937). Correlation and Utilization of New Data on Flow Resistance and Heat Transfer for Cross Flow of Gases Over Tube Banks, *Trans. of ASME*, 59, 583-594.

Ho, C. K. (2017). Advances in central receivers for concentrating solar applications. *Solar Energy*, 152, 38-56.

Ho, C. K., and Iverson, B. D. (2014). Review of high-temperature central receiver designs for concentrating solar power. *Renewable and Sustainable Energy Reviews*, 29, 835-846.

Hoffschmidt, B., Fernández, V., Konstandopoulos, A. G., Mavroidis, I., Romero, M., Stobbe, P., and Téllez, F. (2001, June). Development of ceramic volumetric receiver technology. In *Proceedings of Fifth Cologne Solar Symposium* (pp. 2001-10). DLR Germany.

Hoffschmidt, B., Téllez, F. M., Valverde, A., Fernández, J., and Fernández, V. (2003). Performance evaluation of the 200-kWth HiTRec-II open volumetric air receiver. *Journal of Solar Energy Engineering*, 125(1), 87-94.

Holmes, D. B. (1967). *Experimental studies on laminar flows in ducts*, Doctoral dissertation, TU Delft, Delft University of Technology

Incropera, F. P., DeWitt, D. P., Bergman, T. L., Lavine, A. S., and Incropera, F. P. (2012). *Foundations of Heat Transfer*. Wiley Textbooks.

IRT: Emissivity values for common materials, <http://www.infrared-thermography.com/material.htm> (last accessed: 06/December/2018)

- Islam, M. T., Huda, N., Abdullah, A. B., and Saidur, R. (2018). A comprehensive review of state-of-the-art concentrating solar power (CSP) technologies: Current status and research trends. *Renewable and Sustainable Energy Reviews*, 91, 987-1018.
- Jugder, D., Shinoda, M., Sugimoto, N., Matsui, I., Nishikawa, M., Park, S.U., Chun, Y.S. and Park, M.S. (2011). Spatial and temporal variations of dust concentrations in the Gobi Desert of Mongolia. *Global and Planetary Change*, 78(1-2), 14-22.
- Kasaeian, A., Barghamadi, H., and Pourfayaz, F. (2017). Performance comparison between the geometry models of multi-channel absorbers in solar volumetric receivers. *Renewable energy*, 105, 1-12.
- Kays, W.M. and Perkins, H.C. (1972). in W. M. Rohsenow and J. P. Hartnett, Eds., *Handbook of Heat Transfer*, Chap. 7, McGraw-Hill, New York.
- Kribus, A., Gray, Y., Grijnevich, M., Mittelman, G., Mey-Cloutier, S., and Caliot, C. (2014a). The promise and challenge of solar volumetric absorbers. *Solar Energy*, 110, 463-481.
- Kribus, A., Grijnevich, M., Gray, Y., and Caliot, C. (2014b). Parametric study of volumetric absorber performance. *Energy Procedia*, 49, 408-417.
- Kribus, A., Ries, H., and Spirkl, W. (1996). Inherent limitations of volumetric solar receivers. *Journal of Solar Energy Engineering*, 118, 151.
- Kumar, D. (2013). *Design and Evaluation of Experimental Thermal Energy Storage*, Master of technology thesis, Indian Institute of Technology Jodhpur.
- Kumar, A., Prakash, O., and Dube, A. (2017). A review on progress of concentrated solar power in India. *Renewable and Sustainable Energy Reviews*, 79, 304-307.
- Lacroix, M., Nguyen, P., Schweich, D., Huu, C. P., Savin-Poncet, S., and Edouard, D. (2007). Pressure drop measurements and modeling on SiC foams. *Chemical Engineering Science*, 62(12), 3259-3267.
- Lapple, C. E. (1951). Processes use many collection types. *Chem. Eng.*, 58, 144-151.
- Lee, H. J., Kim, J. K., Lee, S. N., and Kang, Y. H. (2012). Consistent heat transfer analysis for performance evaluation of multichannel solar absorbers. *Solar Energy*, 86(5), 1576-1585.
- Luque, S., Bai, F., González-Aguilar, J., Wang, Z., and Romero, M. (2017, June). A parametric experimental study of aerothermal performance and efficiency in monolithic volumetric absorbers. In *AIP Conference Proceedings* (Vol. 1850, No. 1, p. 030034). AIP Publishing.
- Luque, S., Menéndez, G., Roccabruna, M., González-Aguilar, J., Crema, L., and Romero, M. (2018). Exploiting volumetric effects in novel additively manufactured open solar receivers. *Solar Energy*, 174, 342-351.
- M. Schmücker, Einfluss von Mineralstäuben auf keramische solarabsorber, (2005), [http://www.dlr.de/Portaldata/73/Resources/dokumente/soko/soko2012/Schmuecker\\_2012Soko\\_Mineralstaeben.pdf](http://www.dlr.de/Portaldata/73/Resources/dokumente/soko/soko2012/Schmuecker_2012Soko_Mineralstaeben.pdf) (last accessed: 06/December/2018)
- Marcos, M. J., Romero, M., and Palero, S. (2004). Analysis of air return alternatives for CRS-type open volumetric receiver. *Energy*, 29(5-6), 677-686.
- Mehos, M., Turchi, C., Jorgenson, J., Denholm, P., Ho, C., and Armijo, K. (2016). *On the Path to SunShot-Advancing Concentrating Solar Power Technology, Performance, and Dispatchability* (No. NREL/TP-5500-65688 SAND-2016-2237 R). EERE Publication and Product Library.
- Menigault, T., Flamant, G., and Rivoire, B. (1991). Advanced high-temperature two-slab selective volumetric receiver. *Solar Energy Materials*, 24(1-4), 192-203.
- Michailidis, N., Stergioudi, F., Omar, H., Missirlis, D., Vlahostergios, Z., Tsiapas, S., Albanakis, C. and Granier, B. (2013). Flow, thermal and structural application of Ni-foam as volumetric solar receiver. *Solar Energy Materials and Solar Cells*, 109, 185-191.
- Pabst, C., Feckler, G., Schmitz, S., Smirnova, O., Capuano, R., Hirth, P., and Fend, T. (2017). Experimental performance of an advanced metal volumetric air receiver for Solar Towers. *Renewable Energy*, 106, 91-98.
- Palero, S., Romero, M., and Castillo, J. L. (2008). Comparison of experimental and numerical air temperature distributions behind a cylindrical volumetric solar absorber module. *Journal of Solar Energy Engineering*, 130(1), 011011.
- Patidar, D., Tiwari, S., Sharma, P., Pardeshi, R., Chandra, L., and Shekhar, R. (2015). Solar convective furnace for metals processing. *JOM*, 67(11), 2696-2704.

- Philip, J. (2002). SPFE handbook of fire protection engineering. *Society of Fire Protection Engineers*.  
Pinterest: <https://in.pinterest.com/pin/550354016934972319/?lp=true>.
- Pitz-Paal, R., Fiebig, M., and Cordes, S. (1992). First experimental results from the test of a selective volumetric air receiver. In *Proceedings of the 6th International Symposium on Solar Thermal Concentrating Technologies* (Vol. 1, pp. 277-289).
- Pitz-Paal, R., Hoffschmidt, B., Böhmer, M., and Becker, M. (1997). Experimental and numerical evaluation of the performance and flow stability of different types of open volumetric absorbers under non-homogeneous irradiation. *Solar Energy*, 60(3-4), 135-150.
- Purohit, I., and Purohit, P. (2010). Techno-economic evaluation of concentrating solar power generation in India. *Energy Policy*, 38(6), 3015-3029.
- Reddy, K. S., and Nataraj, S. (2019). Thermal analysis of porous volumetric receivers of concentrated solar dish and tower systems. *Renewable Energy*, 132, 786-797.
- Reuter, H. C. (2017). A review of performance modelling studies associated with open volumetric receiver CSP plant technology. *Renewable and Sustainable Energy Reviews*, 82(3), 3848-3862.
- Rodriguez-Sanchez, M. R., Santana, D., and Olalde, G. (2016). Experimental study of honeycomb SiCSi under highly concentrated solar flux: Evolution of its thermo-radiative properties. *Solar Energy Materials and Solar Cells*, 155, 253-263.
- Roldán, M. I., Ávila-Marín, A., Alvarez-Lara, M., and Fernandez-Reche, J. (2015). Experimental and numerical characterization of ceramic and metallic absorbers under lab-scale conditions. *Energy Procedia*, 69, 523-531.
- Roldán, M. I., Fernández-Reche, J., and Ballestrín, J. (2016). Computational fluid dynamics evaluation of the operating conditions for a volumetric receiver installed in a solar tower. *Energy*, 94, 844-856.
- Roldán, M. I., Smirnova, O., Fend, T., Casas, J. L., and Zarza, E. (2014). Thermal analysis and design of a volumetric solar absorber depending on the porosity. *Renewable Energy*, 62, 116-128.
- Romero, M., Buck, R., and Pacheco, J. E. (2002). An update on solar central receiver systems, projects, and technologies. *Journal of Solar Energy Engineering*, 124(2), 98-108.
- Romero, M., Gonzalez-Aguilar, J., and Zarza, E. (2016). Concentrating solar thermal power. In *Energy Efficiency and Renewable Energy Handbook* (Vol. 1237, No. 1345, pp. 1237-1345). ROUTLEDGE in association with GSE Research.
- Sarma, R. (2013). *Design and Analysis of Recirculating Air System in an Open Volumetric Air Receiver*, Master of technology thesis, Indian Institute of Technology Jodhpur.
- Schlichting, H., and Gersten, K., (2004). Boundary-layer theory. 8<sup>th</sup> ed., *Springer*, New Delhi, 2004, pp. 237-239.
- Schwarzbozl, P., Hack, U., and Ebert, M. (2011). Improvement of ceramic absorbers materials for open volumetric receivers. In *Proceedings of the 17th SolarPACES Conference, Granada, Spain*.
- Shao, Y., and Dong, C. H. (2006). A review on East Asian dust storm climate, modelling and monitoring. *Global and Planetary Change*, 52(1-4), 1-22.
- Sharma, P., Sarma, R., Chandra, L., Shekhar, R., and Ghoshdastidar, P. S. (2015). Solar tower based aluminum heat treatment system: Part I. Design and evaluation of an open volumetric air receiver. *Solar Energy*, 111, 135-150.
- Sharma, P., Sarma, R., Chandra, L., Shekhar, R., and Ghoshdastidar, P. S. (2015). On the design and evaluation of open volumetric air receiver for process heat applications. *Solar Energy*, 121, 41-55.
- Shepherd, C. B., and Lapple, C. E. (1939). Flow pattern and pressure drop in cyclone dust collectors. *Industrial & Engineering Chemistry*, 31(8), 972-984.
- Sherman, M. (1992). A power-law formulation of laminar flow in short pipes. *Journal of Fluids Engineering*, 114(4), 601-605.
- Singh, G. (2014). *Design and Evaluation of Cyclone Separator for Cleaning of Volumetric air Receiver*, Master of technology thesis, Indian Institute of Technology Jodhpur.
- Smirnova, O., Bleider, G., Jakob, C., Schöllgen, D., Fend, T., and Schwarzbozl, P. (2011). Numerical investigation of advanced volumetric receiver materials. In *Proceedings of the 17th SolarPACES Conference, Granada, Spain*.

- Subbarao, P. M., (2015). <http://web.iitd.ac.in/~pmvs/courses/mel242/mel242-27.ppt>.
- Télliez, S. (2003). *Thermal Performance Evaluation of the 200 kW t h Sol Air Volumetric Solar Receiver* (No. CIEMAT--1024). Centro de Investigaciones Energeticas Medioambientales y Tecnologicas (CIEMAT).
- Teng, L., and Xuan, Y. (2018). Thermal and hydrodynamic performance of a novel volumetric solar receiver. *Solar Energy*, 163, 177-188.
- Teske, S., Leung, J., Crespo, L., Bial, M., Dufour, E., Richter, C., and Rochon, E. (2016). Solar thermal electricity: Global outlook 2016. *European Solar Thermal Electricity Association*.
- Tian, Y., and Zhao, C. Y. (2013). A review of solar collectors and thermal energy storage in solar thermal applications. *Applied energy*, 104, 538-553.
- W. M. Kays and H. C. Perkins, in W. M. Rohsenow and J. P. Hartnett, Eds., *Handbook of Heat Transfer*, Chap. 7, McGraw-Hill, New York, 1972.
- Wang, F., Shuai, Y., Tan, H., and Yu, C. (2013). Thermal performance analysis of porous media receiver with concentrated solar irradiation. *International Journal of Heat and Mass Transfer*, 62, 247-254.
- Wang, L. (2004). *Theoretical study of cyclone separator* (Doctoral dissertation, PhD thesis, Biological and Agricultural Engineering, Texas A & M University. USA).
- Wang, Y.Q., Zhang, X.Y., Gong, S.L., Zhou, C.H., Hu, X.Q., Liu, H.L., Niu, T., and Yang, Y. Q. (2007). Surface observation of sand and dust storm in East Asia and its application in CUACE/Dust. *Atmospheric Chemistry and Physics Discussions*, 7(3), 9115-9138.
- White, F. M. (2011)., Fluid mechanics. 7th. *Boston: McGraw-Hill Book Company*.
- Wu, Z., and Wang, Z. (2013). Fully coupled transient modeling of ceramic foam volumetric solar air receiver. *Solar Energy*, 89, 122-133.
- Wu, Z., Caliot, C., Flamant, G. and Wang, Z. (2011). Coupled radiation and flow modeling in ceramic foam volumetric solar air receivers, *Solar Energy* 85(9), 2374-2385.
- Yadav, N. K., Pala, D., and Chandra, L. (2014). On the understanding and analyses of dust deposition on heliostat. *Energy Procedia*, 57, 3004-3013.
- Zhang, H. L., Baeyens, J., Degreève, J., and Cacères, G. (2013). Concentrated solar power plants: Review and design methodology. *Renewable and sustainable energy reviews*, 22, 466-481.
- Zhu, Q., and Xuan, Y. (2018). Performance analysis of a volumetric receiver composed of packed shaped particles with spectrally dependent emissivity. *International Journal of Heat and Mass Transfer*, 122, 421-431.
- Žukauskas, A. (1972). Heat transfer from tubes in crossflow. In *Advances in heat transfer* (Vol. 8, pp. 93-160). Elsevier.

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