

REFERENCES

1. S. Polat, B. Huang, A.S. Mujumdar, and W.J.M. Douglas, Numerical flow and heat transfer under impinging jets: a review, in C. L. Tien and T. C. Chawla(eds.), Annular Review of Numerical Fluid Mechanics and Heat Transfer 2, pp.157-197, Hemisphere, Washington, D. C. (1989).
2. G.B. Stringfellow, Organometallic Vapor Phase Epitaxy: Theory and Practice, Academic Press, San Diego, chapter 5 (1989).
3. S.A. Campbell, The Science and Engineering of Microelectronic Fabrication, Oxford University Press, New York, chapter 6 (1996).
4. M.L. Hitchamn and K.F. Jensen, Chemical vapor deposition (Principle and Application), Academic Press, San Diego, chapter 2 (1993).
5. T.C. Cheng, P.H. Chiou and T.F. Lin, Visualization of mixed convective vortex rolls in an impinging jet flow of air through a cylindrical chamber, International Journal of Heat and Mass Transfer 45 (2002) 3357-3368.
6. R. Gardon and J.C. Akfirat, The role of turbulence in determining the heat-transfer characteristics of impinging jets, International Journal of Heat and Mass Transfer 8 (1965) 1261-1272.
7. R. Gardon and J.C. Akfirat, Heat transfer characteristics of impinging two-dimensional air jets, ASME Transac. C, Journal of Heat Transfer (1966) 101-108.
8. M.T. Scholtz and O. Trass, Mass transfer in a nonuniform impinging jet, AIChE J. 16 (1970) 90-96.
9. E.M. Sparrow and T.C. Wong, Impingement transfer coefficients due to initially laminar slot jets, International Journal of Heat and Mass Transfer 18 (1975) 597-605.
10. J.H. Masliyah and T.T. Nguyen, Mass transfer due to an impinging slot jet, International Journal of Heat and Mass Transfer 22 (1979) 237-244.
11. P. Hrycak, Heat transfer from round impinging jets to a flat plate, International Journal of Heat and Mass Transfer 26 (1981) 1857-1865.
12. İ.B. Özdermir and J.H. Whitelaw, Impingement of an axisymmetric jet on unheated and heated flat plates, J. Fluid Mech. 240 (1992) 503-532.

13. T. Liu and J.P. Sullivan, Heat transfer and flow structures in an excited circular impinging jet, International Journal of Heat and Mass Transfer 39 (1996) 3695-3706.
14. A.R.P. van Heiningen, A.S. Mujumdar and W.J.M. Douglas, Numerical prediction of the flow field and impingement heat transfer caused by a laminar slot jet, ASME Transac. C, J. Heat Transfer 98 (1976) 654-658.
15. N.R. Saad, W.J.M. Douglas and A.S. Mujumdar, Prediction of heat transfer under an axisymmetric laminar impinging jet, Int. Eng. Chem. Fundam. 16 (1977) 148-154.
16. H.S. Law and J.H. Masliyah, Mass transfer due to a confined laminar impinging axisymmetric jet, Int. Eng. Chem. Fundam. 23 (1984) 446-454.
17. S.M. Hosseinalipour and A.S. Mujumdar, Comparative evaluation of different turbulence models for confined impinging and opposing jet flows, Num. Heat Transfer, Part A 28 (1995) 647-666.
18. G.K. Morris and S.V. Garimella, Orifice and impingement flow fields in confined jet impingement, J. Electronic Packaging 120 (1998) 68-72.
19. Z.H. Lin, Y.J. Chou, and Y.H. Hung, Heat transfer behaviors of a confined slot jet impingement, International Journal of Heat and Mass Transfer 40 (1997) 1095-1107.
20. D.L. Besserman, F.P. Incropera and S. Ramadhyani, Experimental study of heat transfer from a discrete source to a circular liquid jet with annular collection of the spent fluid, Exper. Heat Transfer 4 (1991) 41-57.
21. D.L. Besserman, S. Ramadhyani and F.P. Incropera, Numerical simulation of laminar flow and heat transfer for liquid jet impingement cooling of a circular heat source with annular collection of the spent fluid, Numerical Heat Transfer, Part A 20 (1991) 263-278.
22. M. Behnia, S. Parneix, Y. Shabany. P.A. Durbin, Numerical study of turbulent heat transfer in confined and unconfined impinging jets, International Journal of Heat and Fluid Flow 20 (1999) 1-9.
23. L.P. Chua, S.C.M. Yu, H-S. Li, Flow visualization and preliminary measurements of a confined jet with and without target, International Communications in Heat

- and Mass Transfer 27 (2000) 191-200.
24. P.R. Voke, S. Gao, Numerical study of heat transfer from an impinging jet, International Journal of Heat and Mass Transfer 41 (1998) 671-680.
25. J.A. Fitzgerald, S.V. Garimella, A study of the flow field of a confined and submerged impinging jet, International Journal of Heat and Mass Transfer 41 (1998) 1025-1034.
26. V.A. Marple, B.Y.H. Liu, K.T. Whitby, On the flow fields of inertial impactors, Transactions of the ASME, Journal of Fluids Engineering (1974) 394-400.
27. S.V. Garimella, R.A. Rice, Confined and submerged liquid jet impingement heat transfer, Journal of Heat Transfer 117 (1995) 871-877.
28. S. Ashforth-Forst, K. Jambunathan, C.F. Whitney, Velocity and turbulence characteristics of a semi-confined orthogonally impinging slot jet, Experimental Thermal and Fluid Science 14 (1997) 60-67.
29. S. Ashforth-Frost, K. Jambunathan, Effect of nozzle geometry and semi-confinement on the potential core of a turbulent axisymmetric free jet, International Communications in Heat and Mass Transfer 23 (1996) 155-162.
- 30 E. Baydar, Confined impinging air jet at low Reynolds numbers, Experimental Thermal and Science 19 (1993) 27-33.
31. J. Lee and S-J. Lee, The effect of nozzle aspect ratio on stagnation region heat transfer characteristics of elliptic impinging jet, International Journal of Heat and Mass Transfer 43 (2000) 555-575.
32. B.N. Pamadi, I.A. Belov, A note on the heat transfer characteristics of circular impinging jet, International Journal of Heat and Mass Transfer 23 (1980) 783-787.
33. D. Lytle, B.W. Webb, Air jet impingement heat transfer at low nozzle-plate spacings, International Journal of Heat and Mass Transfer 37 (1994) 1687-1697.
34. C.Y. Li, S.V. Garimella, Prandtl number effects and generalized correlations for confined and submerged jet impingement, International Journal of Heat and Mass Transfer 44 (2001) 3471-3480.
35. H.S. Law, J.H. Masliyah, Numerical prediction of the flow field due to a confined laminar two-dimensional submerged jet, Computers & Fluids 12 (1984) 199-215.

36. D. Schafer, F. P. Incropera, S. Ramadhyani, Planar liquid jet impingement cooling of multiple discrete heat sources, *J. Electronic Packaging* 113 (1991) 359-366.
37. D.W. Colucci, R. Viskanta, Effect of nozzle geometry on local convective heat transfer to a confined impinging air jet, *Experimental Thermal and Fluid Science* 13 (1996) 71-80.
38. M.D. Deshpande, R.N. Vaishnav, Submerged laminar jet impingement on a plane, *Journal of Fluid Mechanics* 114 (1982) 213-236.
39. L. Huang, M.S. El-Genk, Heat transfer and flow visualization experiments of swirling, multi-channel, and conventional impinging jets, *International Journal of Heat and Mass Transfer* 41 (1998) 583-600.
40. V.A. Chiriac and A. Ortega, A numerical study of the unsteady flow and heat transfer in a transitional confined slot jet impinging on an isothermal surface, *International Journal of Heat and Mass Transfer* 45 (2002) 1237-1248.
41. R. Viskanta, Heat transfer to impinging isothermal gas and flame jets, *Experimental Thermal and Fluid Science* 6 (1993) 111-134.
42. K. Jambunathan, E. Lai, M.A. Moss, B.L. Button, A review of heat transfer data for single circular jet impingement, *International Journal of Heat and Fluid Flow* 13 (1992) 106-115.
43. K. Ichimiya, S. Takema, S. Morimoto, T. Kunugi, N. Akino, Movement of impingement heat transfer by single circular jet with a confined wall, *International Journal of Heat and Mass Transfer* 44 (2001) 3095-3102.
44. H.V. Stanten, C.R. Kleijn, H.E.A. Van Den Akker, Mixed convention in radial flow between horizontal plates— I. Numerical simulations, *International Journal of Heat and Mass Transfer* 43 (2000) 1523-1535.
45. H.V. Stanten, C.R. Kleijn, H.E.A. Van Den Akker, Mixed convention in radial flow between horizontal plates— II. Experiments, *International Journal of Heat and Mass Transfer* 43 (2000) 1537-1546.
46. B. Elison, B.W. Webb, Local heat transfer to impinging liquid jets in the initially laminar, transitional, and turbulent regimes, *International Journal of Heat and Mass Transfer* 37 (1994) 1207-1216.
47. K.J. McNaughton, C.G. Sinclair, Submerged jets in short cylindrical flow vessels,

- Journal of Fluid Mechanics 25 (1966) 367-375.
48. G. Wahl, Hydrodynamic description of CVD processes, Thin Solid Films 40 (1977) 13-26.
49. D.I. Fotiadis and S. Kieda, Transport phenomena in vertical reactors for metalorganic vapor phase epitaxy, J. Crystal Growth 102 (1990) 441-470.
50. A.H. Dilawari, and J. Szekely, A mathematical representation of a modified stagnation flow reactor for MOCVD application, J. Crystal Growth 108 (1991) 491-498.
51. C.R. Biber, C.A. Wang, and S. Motakef, Flow regime map and deposition rate in vertical rotating-disk OMVPE reactor, J. Crystal Growth 123 (1992) 545-554.
52. P.N. Gadgil, Optimization of a stagnation point flow reactor design for metalorganic chemical vapor deposition by flow visualization, J. Crystal Growth 134 (1993) 302-312.
53. H.V. Santen, C.R. Kleijn, H.E.A. Van Den Akker, Symmetry breaking in a stagnation-flow CVD reactor, J. Crystal Growth 212 (2000) 311-323.
54. S. Chatterjee, I. Trachtenberg, and T.F. Edgar, Mathematical modeling of a single-wafer RTP thermal reactor, J. Electrochem. Soc 139 (1992) 3682-3689.
55. P.N. Gadgil, Single wafer processing in stagnation point flow CVD reactor: prospects, constraints and reactor design, J. Electronic Materials 22 (1993) 171-177.
56. Y. Kusumoto, T. Hayashi, S. Komiya, Numerical analysis of the transport phenomena in MOCVD process, Japanese Journal of Applied Physics 24 (1985) 620-625.
57. H.V. Santen, C.R. Kleijn, H.E.A. Van Den Akker, On turbulent flows in cold-wall CVD reactors, J. Crystal Growth 212 (2000) 299-310.
58. S.J. Kline, F.A. McClintock, Describing uncertainties in single-sample experiment, Mech. Eng. 75 (1953) 3-8.