

Evaporative Cooling

The science of *beating the heat*.

by D. James Benton

...just the color figures for those who got the B&W printed book...

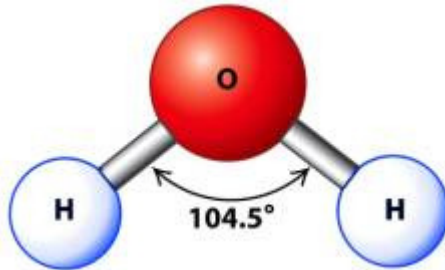
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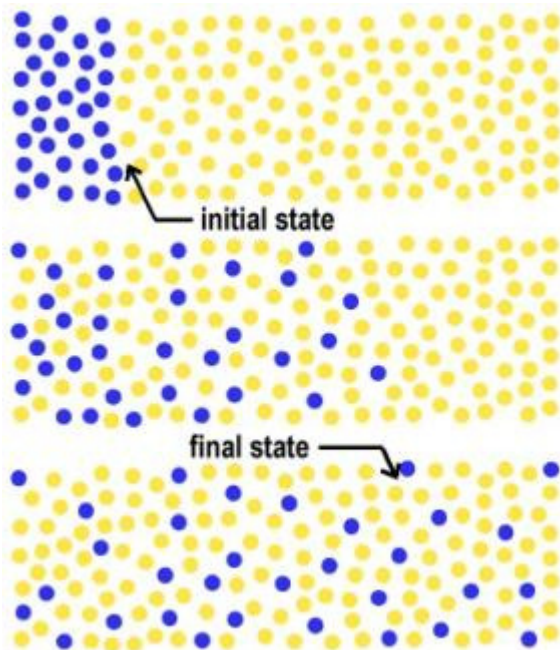
Foreword

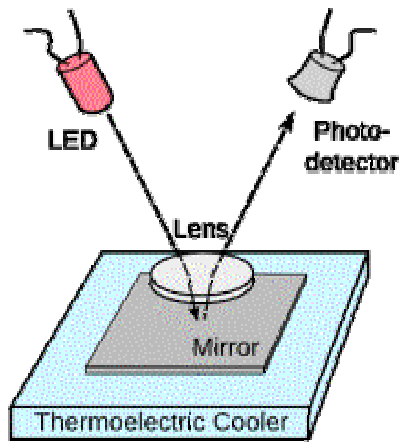
Evaporative cooling is vital for life and industry. Benefiting from this essential process is as natural as sweating. It's the most efficient means of rejecting unwanted heat. The economy of evaporative cooling has made it the first choice of manufacturing and power production. There is rarely time to adequately address this important topic in a course on heat transfer. Many articles and books present the mechanical and even economic aspects of evaporative cooling. This book presents the computational (i.e., mathematical) aspects. All of the software discussed in this book is available free on-line, including considerable source code.

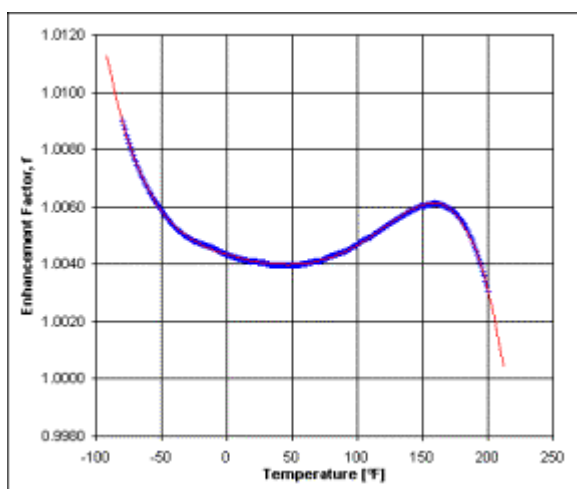
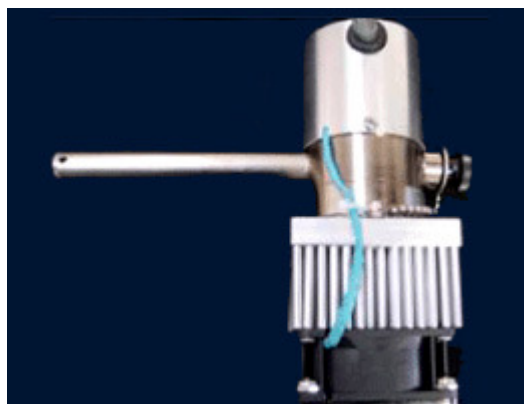
*All of the examples contained in this book,
(as well as a lot of free programs) are available at...*

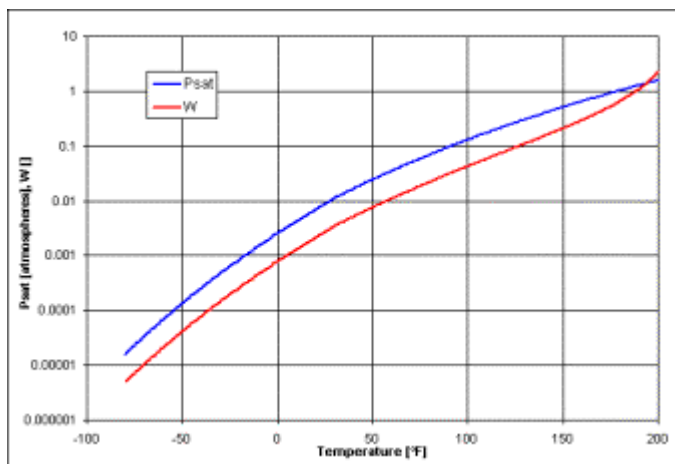
<http://www.dudleybenton.altervista.org/software/index.html>





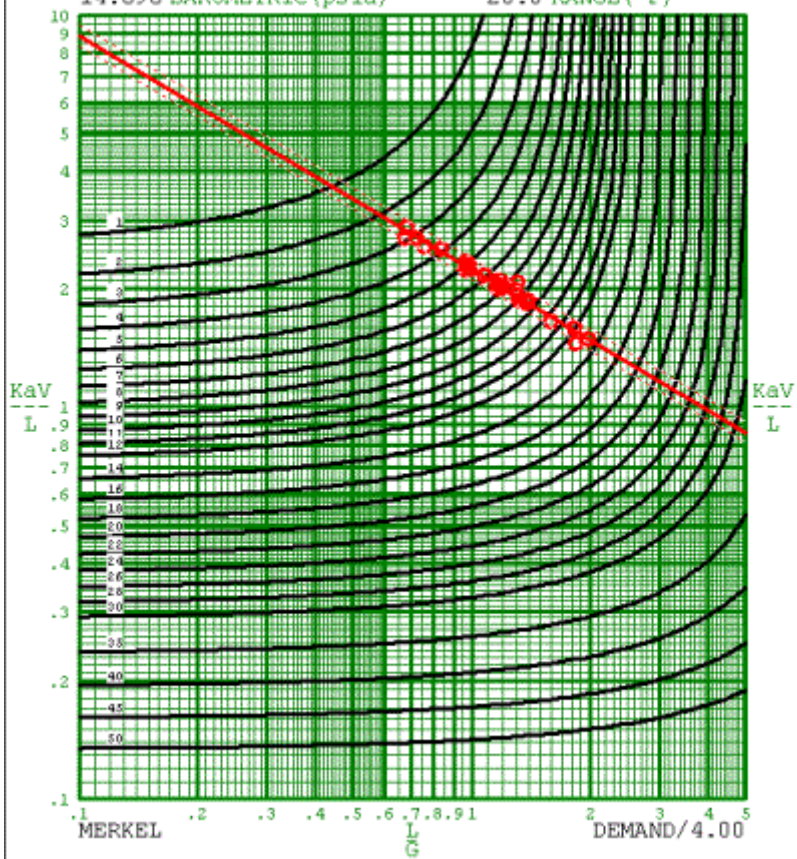


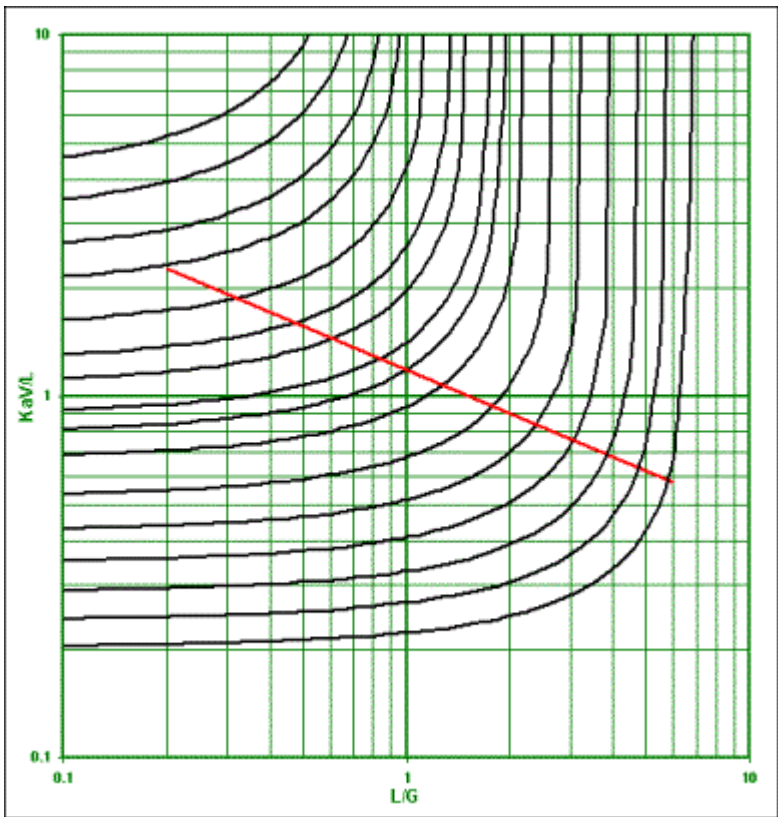


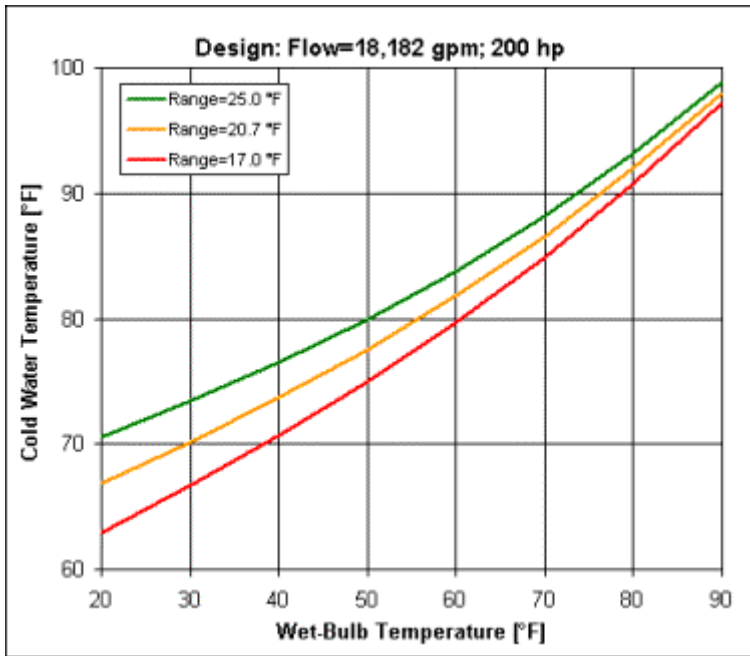


M19060.5FT
14.696 BAROMETRIC (psia)

78.0 WET BULB (°F)
20.0 RANGE (°F)







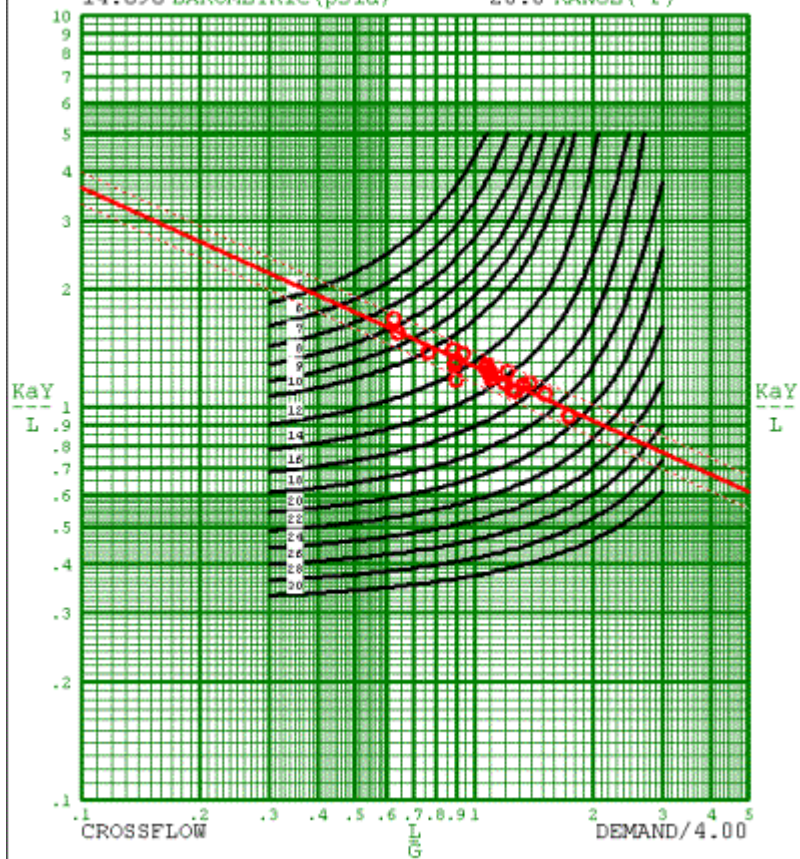
Crossflow Cooling Tower Demand Calculations

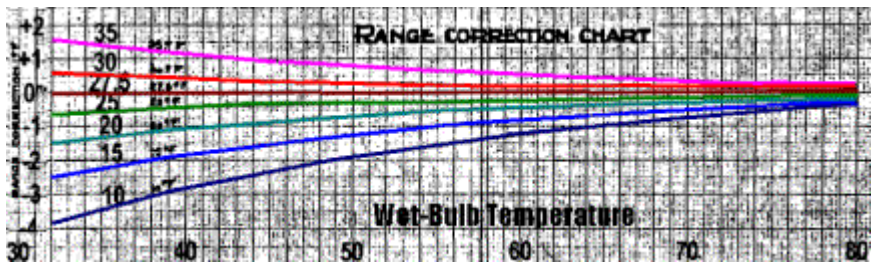
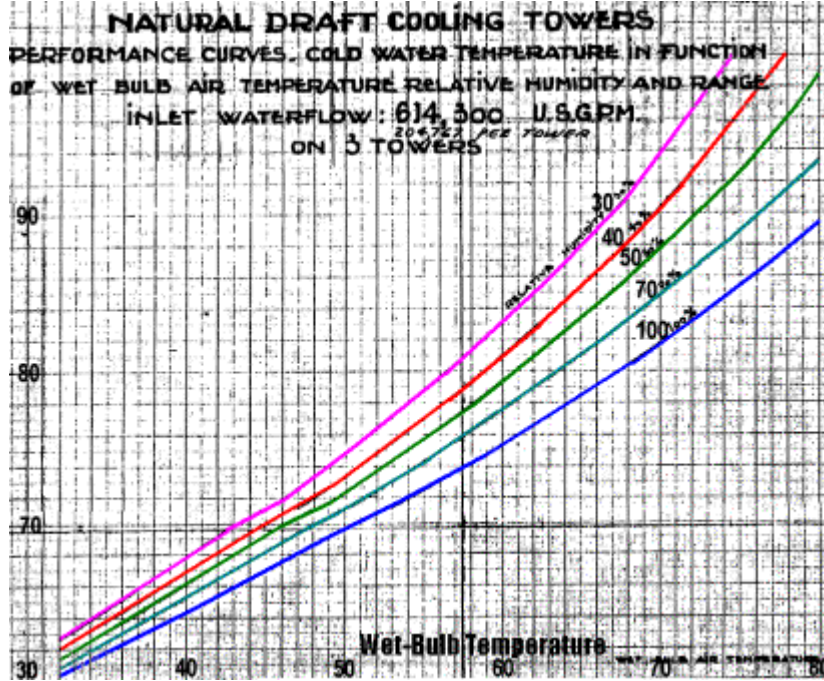
user inputs
50 T_{wb}
120 Thw
2.00 L/G
1.38 K_aY
calculations
83.2 T_{cw}
36.8 range
33.2 approach

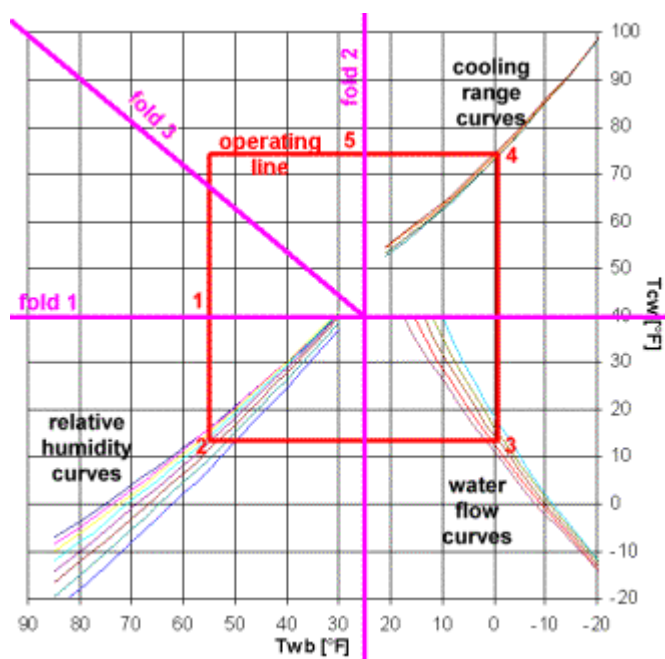
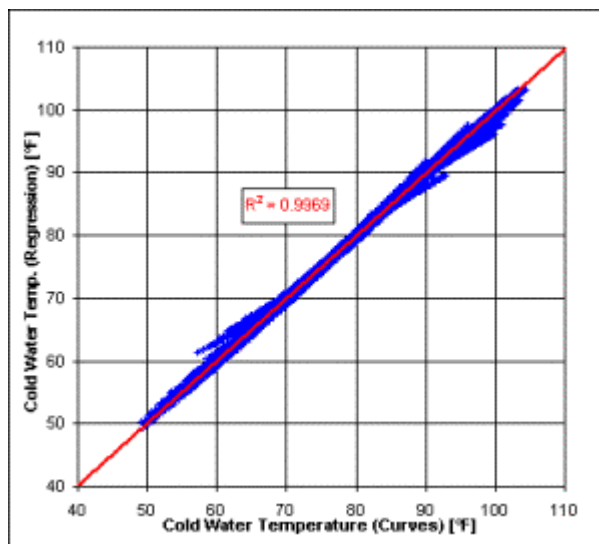
T _a						T _w				
						120.0	120.0	120.0	120.0	120.0
50	102	113	117	119	119	92.8	107.7	114.5	117.5	118.9
50	78	97	108	113	117	81.7	95.2	104.3	110.6	114.7
50	70	86	97	105	111	74.7	87.1	96.2	103.2	108.5
50	65	79	89	98	104	69.8	81.1	89.9	96.9	102.6
50	62	74	83	91	98	66.0	76.4	84.7	91.7	97.4
						H _w				
H _a						119.7	119.7	119.7	119.7	119.7
20.3	75.2	89.7	110.7	115.7	117.9	59.6	87.2	103.7	112.2	116.3
20.3	42.0	66.9	87.2	101.0	109.4	45.6	63.7	80.1	93.9	104.2
20.3	34.3	50.5	66.8	81.8	94.2	38.4	52.1	65.3	77.7	88.9
20.3	30.3	42.3	55.0	67.5	79.3	33.9	44.9	55.8	66.4	76.6
20.3	27.8	37.2	47.5	57.9	68.2	30.8	39.9	49.1	58.3	67.3

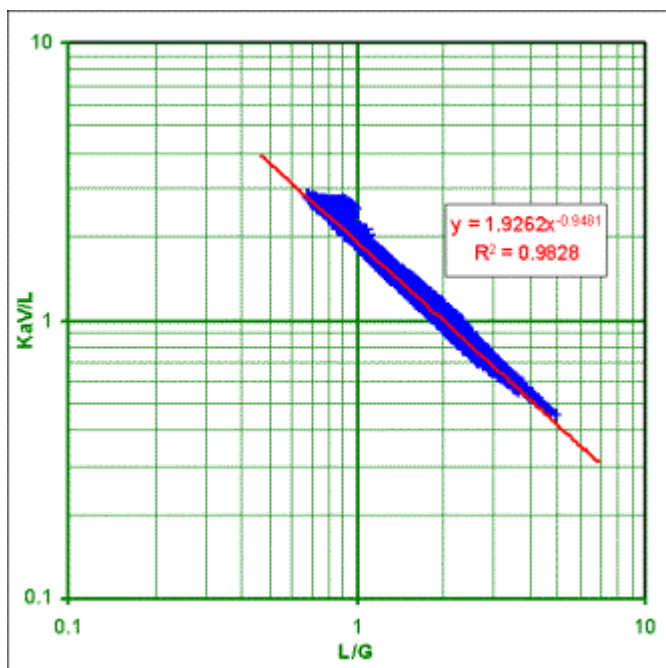
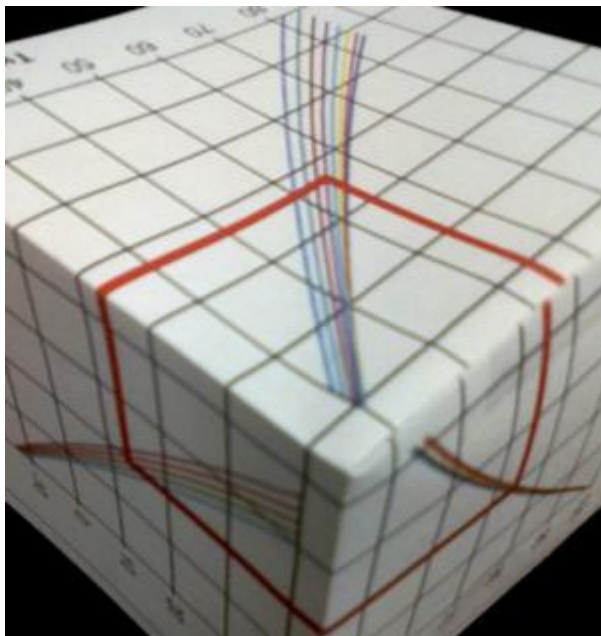
SHAPE10.11F
14.696 BAROMETRIC (psia)

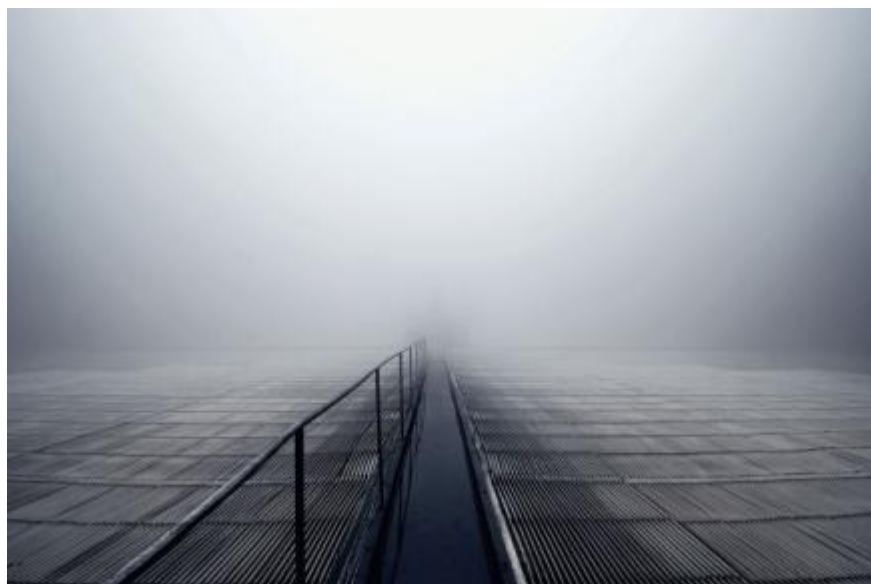
78.0 WET BULB (°F)
20.0 RANGE (°F)

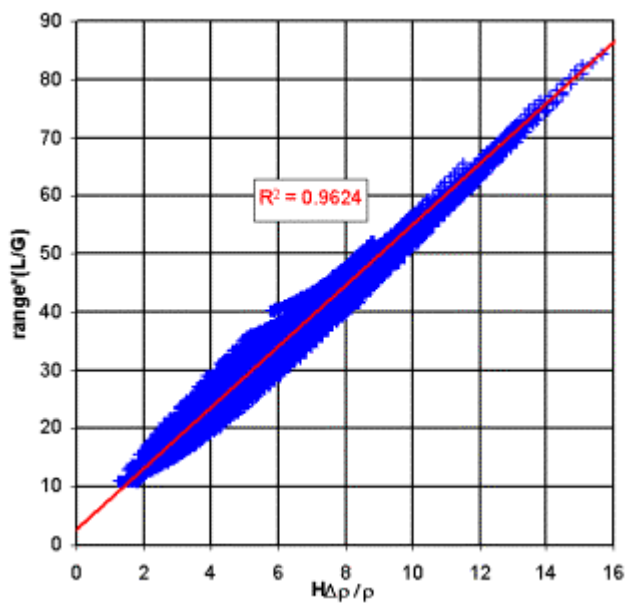


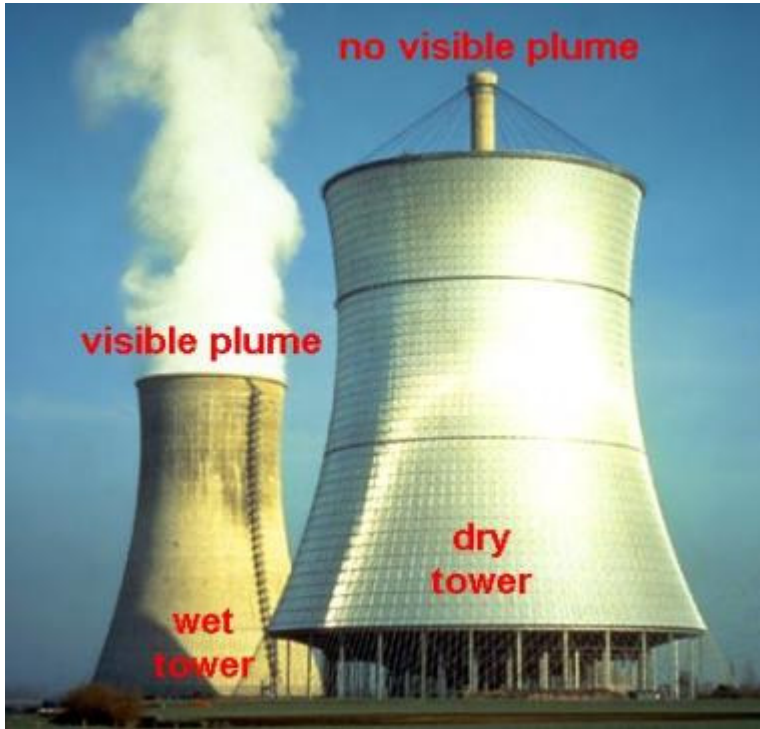


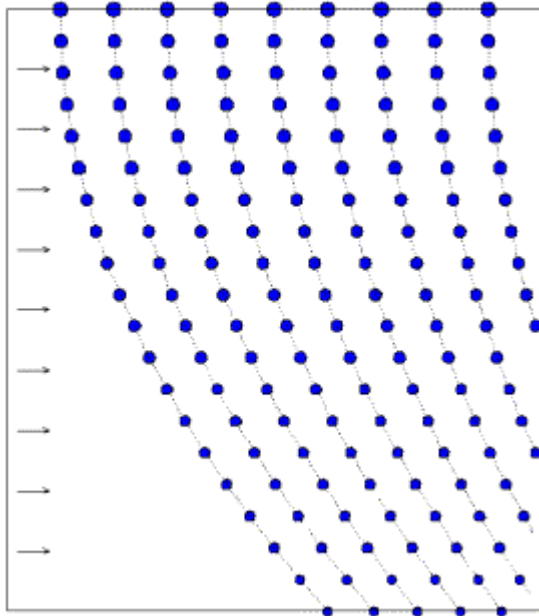






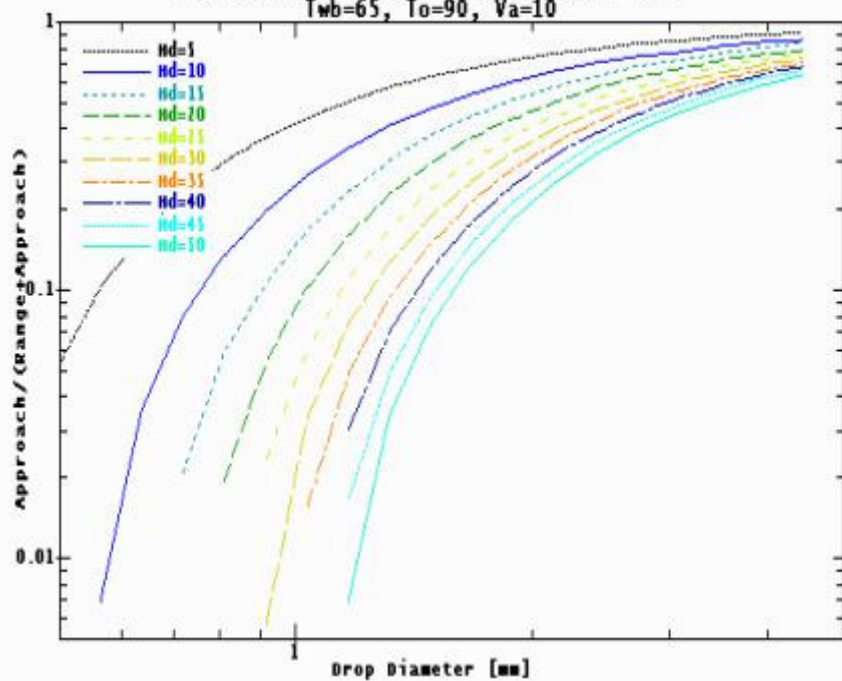


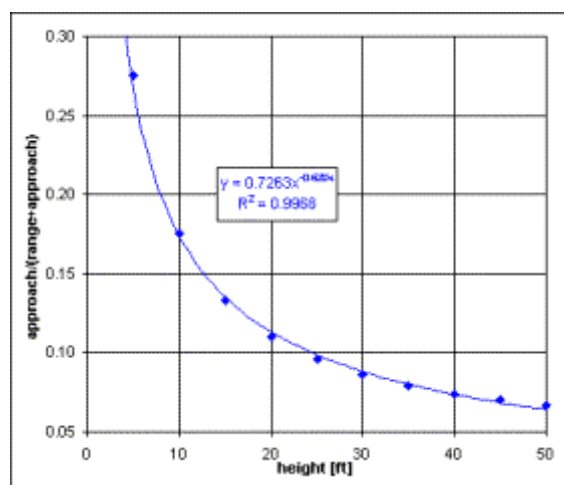
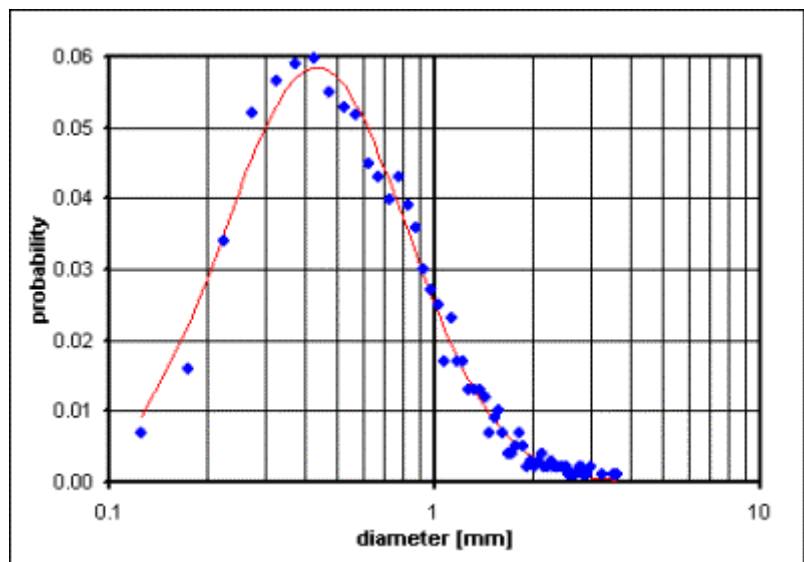


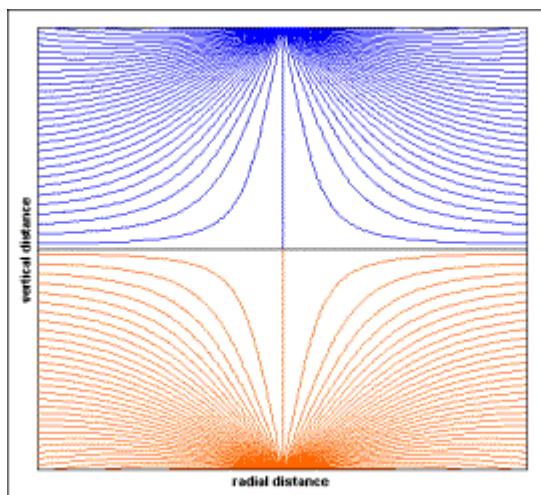


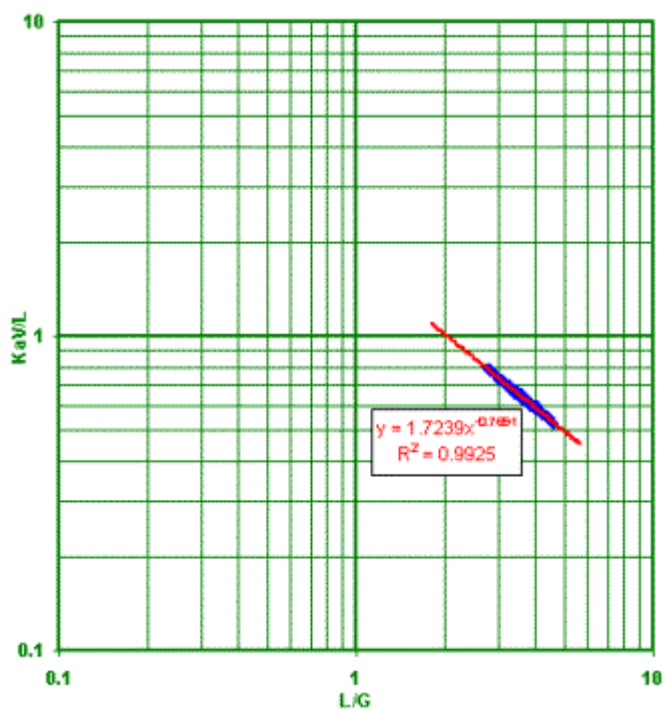
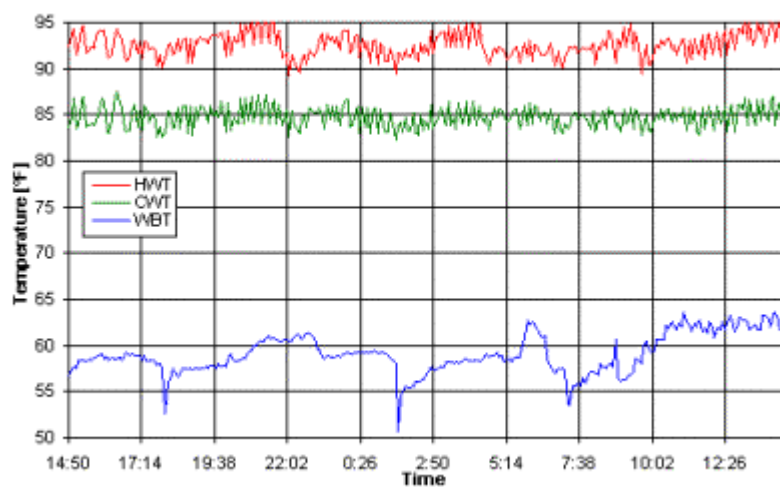
HEAT AND MASS TRANSFER FOR A SINGLE DROP

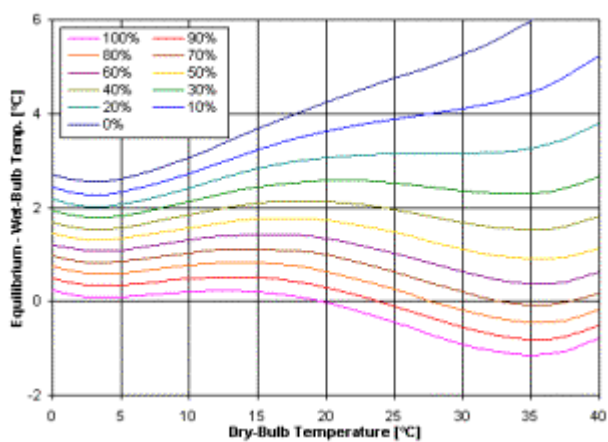
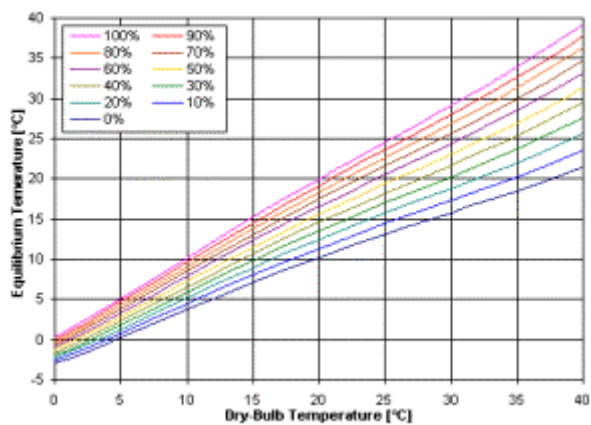
$T_{wb}=65$, $T_o=90$, $V_a=10$



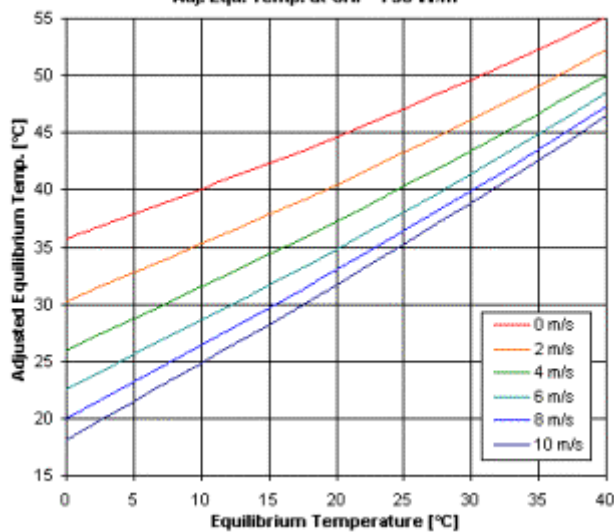








Adj. Equ. Temp. at GHI = 750 W/m²



Pond Geometry

