Gupta Problem 2.21

C_E=1.3e-3
u (wind speed) = 23 m/sec
air temp = 23 C
max reservoir temp = 18. C
min res temp = 15. C
Air pressure 101.325 kPa from appdx B
density and vapor pressures also in appdx C and D

$$M = .622 \frac{\rho_a \cdot C_E}{\rho_w \cdot P}$$

$$E_a = M \cdot u_z(e_{surface} - e_{air})$$

In [2]:
```
import quantities as un
T_res=(18.+15)/2.
rho_water=((T_res-15)/(20.-15)*(.99821-.99910)+.99910)*un.g/un.cm**3
print rho_water
```

```
0.998833 g/cm**3
```

In [3]:
```
rho_air=((23-20)/(25.-20)*(1.184-1.204)+1.204)*un.kg/un.m**3
print rho_air
```

```
1.192 kg/m**3
```

In [6]:
```
C_E=1.3e-3
u=23.*un.m/un.sec
P=101.325e3*un.Pa
M=.622*(rho_air*C_E)/(rho_water*P)
print M.simplified
```

```
9.52358577392e-12 m*s**2/kg
```

In [11]:
```
H=.47#relative humidity
e_s=((T_res-15)/(20.-15)*(2.337-1.706)+1.706)*un.kPa
e_a=H*((23-20)/(25.-20)*(3.169-2.337)+2.337)*un.kPa
print("{0},{1}".format(e_s,e_a))
```

```
1.8953 kPa,1.333014 kPa
```

In [14]:
```
E=M*u*(e_s-e_a)
print E.simplified
```

```
1.23164515861e-07 m/s
```

In [17]:
```
E.units=un.mm/un.day
print E
```

```
10.6414141704 mm/d
```