



The figure on page 60 is a misprint. Please refer to this corrected figure:

What Determines the Temperature of the Earth?
0-dimensional Analysis: Štefan-Boltzmann Law


Energy Balance: $E_{in}=E_{out}$
 $E_{in} = \pi r^2 (1-\alpha) S$ $E_{out} = 4\pi r^2 \varepsilon \sigma T^4$
 $\frac{(1-\alpha)S}{4} = \varepsilon \sigma T^4$ $T = \sqrt[4]{\frac{(1-\alpha)S}{4\varepsilon\sigma}} = 289K$

σ is the Štefan-Boltzmann constant
S is the solar irradiance ($\approx 1366 \text{ W/m}^2$)
 α is the planetary albedo (≈ 0.29 due to aerosols, clouds, surface)
 ε is the emissivity (≈ 0.61 due to greenhouse gases, clouds, surface)

Jožef Štefan **Ludwig Boltzmann**
 1835-1893 1844-1906

Štefan-Boltzmann Constant
 $\sigma = \frac{2\pi^5 k^4}{15c^2 h^3} = 5.67 \times 10^{-8} \frac{W}{m^2 K^4}$





The figure on page 60 is a misprint. Please refer to this corrected figure:

What Determines the Temperature of the Earth?
0-dimensional Analysis: Štefan-Boltzmann Law

Energy Balance: $E_{in}=E_{out}$
 $E_{in} = \pi r^2 (1-\alpha) S$ $E_{out} = 4\pi r^2 \varepsilon \sigma T^4$
 $\frac{(1-\alpha)S}{4} = \varepsilon \sigma T^4$ $T = \sqrt[4]{\frac{(1-\alpha)S}{4\varepsilon\sigma}} = 289K$

σ is the Štefan-Boltzmann constant
S is the solar irradiance ($\approx 1366 \text{ W/m}^2$)
 α is the planetary albedo (≈ 0.29 due to aerosols, clouds, surface)
 ε is the emissivity (≈ 0.61 due to greenhouse gases, clouds, surface)

Jožef Štefan **Ludwig Boltzmann**
 1835-1893 1844-1906

Štefan-Boltzmann Constant
 $\sigma = \frac{2\pi^5 k^4}{15c^2 h^3} = 5.67 \times 10^{-8} \frac{W}{m^2 K^4}$

