$\sin\theta = \theta - \frac{\theta^3}{3!} + \frac{\theta^5}{5!} - \frac{\theta^7}{7!} + \cdots$ $E_b = \sigma T^4$

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$e^{i\pi} = -1$ $\frac{u}{u_\tau} = \frac{1}{\kappa}\ln\frac{yu_\tau}{\nu} + C$

USER GUIDE

International Standard Atmosphere Web Application

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21 September 2020

Atkinson Science welcomes your comments on this User Guide. Please send an email to keith.atkinson@atkinsonscience.co.uk.

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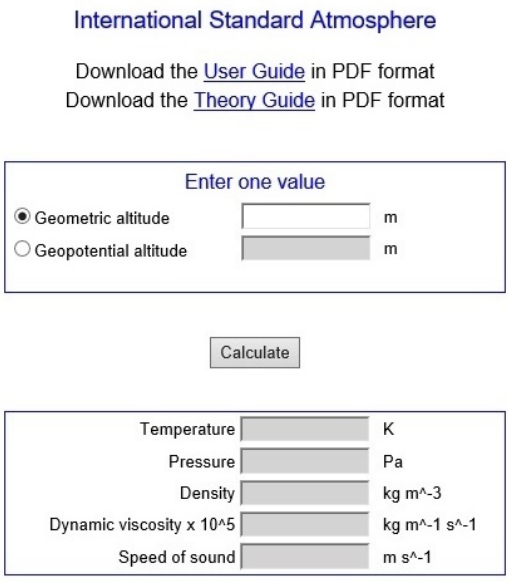
1 Introduction

The ASL International Standard Atmosphere Web application is a model of the Earth's atmosphere which gives the temperature, pressure and other properties of the atmosphere at the altitude specified by the user. It was created in Microsoft Visual Studio 2017. The model is an implementation of the International Standard Atmosphere described in the document ISO 2533:1975 published in 1975 by the International Standards Organisation. You can find the ASL International Standard Atmosphere web application at the web page https://atkinsonscience.co.uk/WebApps/Aerospace/ISA.aspx. There is also a theory guide that you can download from the same page.

2 User interface

The user interface of the Web application is shown in Figure 1. It consists of a box in which the user enters either the geometric altitude or the geopotential altitude, a button to calculate the properties of the atmosphere, and a box in which the calculated properties are displayed.

Figure 1 User interface



In ISO 2533:1975, equations for the properties of the atmosphere are written in terms of the geopotential altitude. The acceleration due to gravity varies with altitude, and the geopotential altitude is a measurement of altitude adjusted to account for the effect of this variation on the atmospheric properties. Both forms of the altitude are defined as zero at sea level. The geopotential altitude h can be obtained from the geometric altitude z as follows:

$$h = \left(\frac{R_E}{R_E + z}\right) z \qquad (1)$$

where R_E is the radius of the Earth, which is defined as 6,356 km.

Rearranging Eqn. (1) enables the geometric altitude to be obtained from the geopotential altitude:

$$z = \left(\frac{R_E}{R_E - h}\right) h \quad (2)$$

If the user enters the geometric altitude into the Web application, it will calculate and display the geopotential altitude, and vice-versa.

The highest geometric altitude that may be entered into the application is 86,000 m. This figure corresponds to a geopotential altitude of 84,852 m, which is the highest geopotential altitude that may be entered. The lowest altitude (geometric or geopotential) that may be entered is zero, which corresponds to sea level. If the user goes beyond these limits, the application will issue an error message.