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Calculating the Wing Lift Distribution with the Diederich Method in Microsoft Excel

Aim of this project is to provide the Diederich Method for calculating the lift distribution of a wing in a Microsoft Excel spreadsheet based on didactic considerations. The Diederich Method is described based on primary and secondary literature. Diagrams are digitized so that the method can run automatically. To optimize the lift distribution of the wing, the elliptical and triangular lift distribution as well as Mason's lift distribution are offered for comparison. A method for calculating the maximum lift coefficient of the wing is integrated into the Diederich Method. To do this, the maximum lift coefficients of the airfoils at the wing root and at the wing tip must be entered in the program. The calculation assumes a trapezoidal wing. Both wing sweep and linear wing twist can be taken into account. The aspect ratio must not assume values that are too small. Subsonic flow and unseparated flow are assumed. Since only the wing is described, all other influences such as from the fuselage or from the engines are not taken into account. The Excel workbook was created for teaching in aircraft preliminary design. At the moment, the Diederich Method is apparently nowhere offered as a spreadsheet. With this work, this gap can be closed.

This informative poster is based on a student project with the same title. Details here:
https://nbn-resolving.org/urn:nbn:de:gbv:18302-aero2023-04-13.012

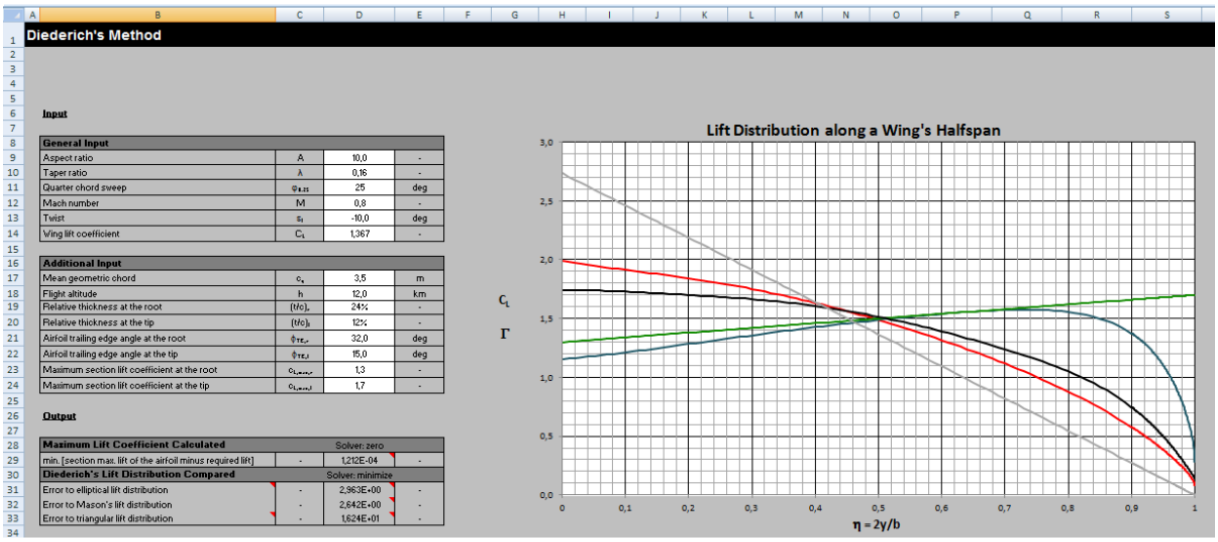

Figure 1: Screen shot of part of the display of the Excel workbook to calculate the lift distribution and the maximum lift coefficient of a wing with the Diederich Method.

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