

Excel-VBA as Modelling Platform for Thermodynamic Optimisation of an R290/R600a Cascade Refrigeration System

Authors : M. M. El-Awad

Abstract : The availability of computers and educational software nowadays helps engineering students acquire better understanding of engineering principles and their applications. With these facilities, students can perform sensitivity and optimisation analyses which were not possible in the past by using slide-rules and hand calculators. Standard textbooks in engineering thermodynamics also use software such as Engineering Equation Solver (EES) and Interactive Thermodynamics (IT) for solving calculation-intensive and design problems. Unfortunately, engineering students in most developing countries do not have access to such applications which are protected by intellectual-property rights. This paper shows how Microsoft Excel™ and VBA (Visual Basic for Applications), which are normally distributed with personal computers and laptops, can be used as an alternative modelling platform for thermodynamic analyses and optimisation. The paper describes the VBA user-defined-functions developed for determining the refrigerants properties with Excel. For illustration, the combination is used to model and optimise the intermediate temperature for a propane/iso-butane cascade refrigeration system.

Keywords : thermodynamic optimisation, engineering education, excel, VBA, cascade refrigeration system

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