



University of Bahrain
College of Engineering
Department of Chemical Engineering

2021/2022
First Semester

COMPUTER AIDED DESIGN TOOL FOR DESIGNING AND EVALUATING REBOILERS

Abstract

A friendly software tool for designing/rating kettle and vertical thermosyphon reboilers is developed using MATLAB Graphical User Interface (GUI). The tool algorithm design procedure and codes is based on Tubular Exchanger Manufacturers Association standards. The validity of the developed tool was evaluated using numerous literature examples as well with aspen exchanger design and rating software. Results of the current project is in good agreement with the literature's results as well as with Aspen Exchanger Design and Rating software.

Objectives and Motivation

Design of reboilers is open ended problems type. i.e, requires trial and error type calculations. In design courses, the design calculations are required to be conducted using hand calculations. Although hand calculations are required to understand the design principles, it is a tedious process, prone to errors and consumes time. The project's objective is to develop a friendly use software package that will help students/users to conduct a simple and reliable design/rating method.

Design

The project begins by conducting a research to obtain the necessary information for the design and rating of reboilers and transferring these data as per code in MATLAB.

The required charts are digitalized and modeled into correlations by the help of OriginLab software.

Next, the MATLAB code is converted into GUI using app designer tool in MATLAB.

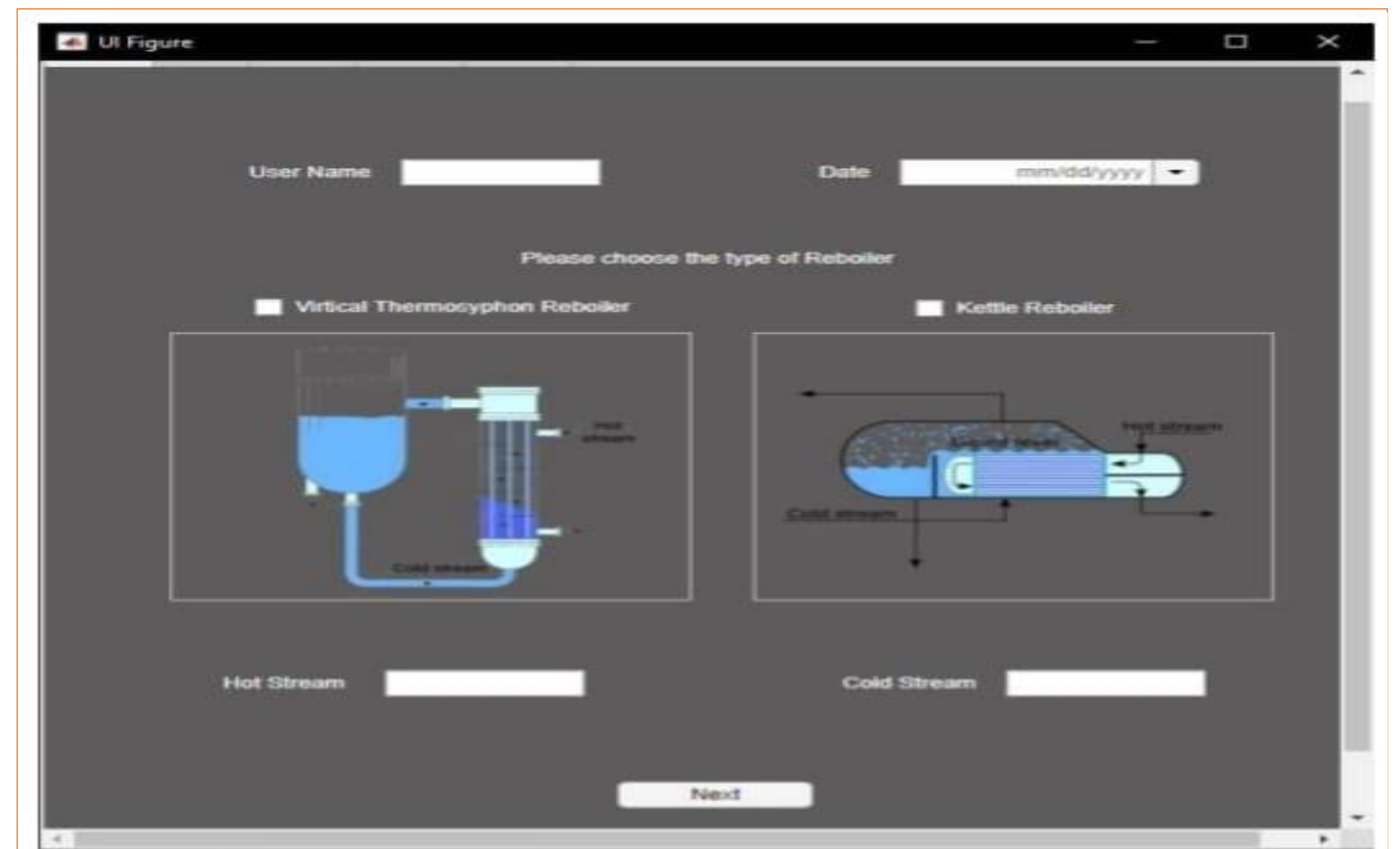
The built program was divided into three stages: (i) Assembling input data, (ii) processing the input and (iii) results display.

The input data were assembled using different UI components e.g., numeric edit field, dropdown list and check boxes.

Moreover, callbacks were added to buttons to make the program more interactive and user friendly.

The attained package results are shown in separate window with options to exporting to excel sheet and printing PDF document. Furthermore, alerts are provided to notified the user in case of incorrect input data insertion or in the case of "out of design range" results.

Implementation

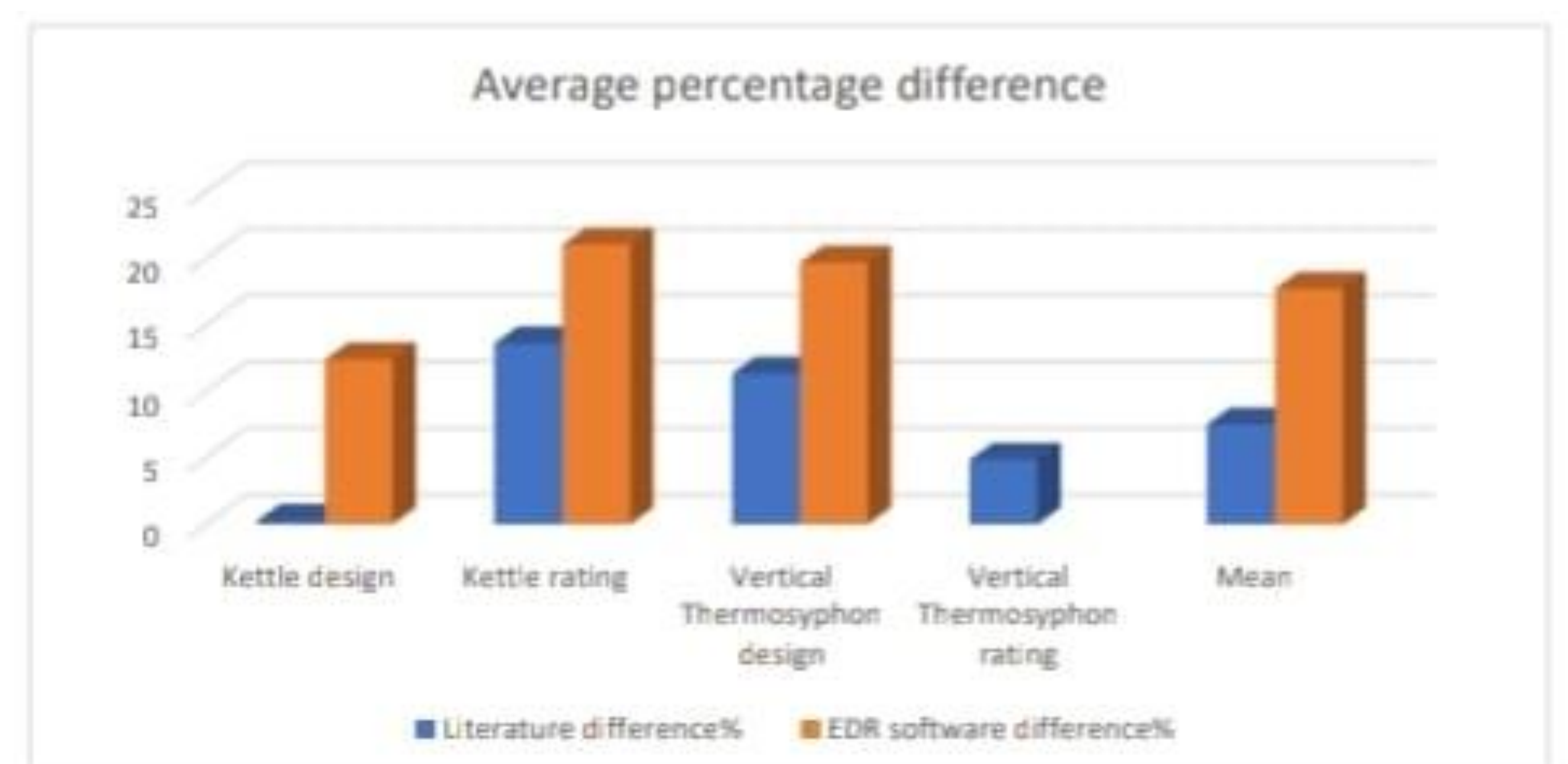


Results

The validity of the developed tool was evaluated using numerous literatures examples as well as with aspen exchanger design and rating software.

The average percentage differences between ADRT and literure data are shown below.

The mean average percentage differences for the most important parameters were 7.51%, and 17.7% for the literature and EDR software, respectively.



Conclusion

The main objective of the project (COMPUTER AIDED DESIGN TOOL FOR DESIGNING AND EVALUATING REBOILERS) been successfully achieved. The output results were found in good agreement with literature and EDR software.

Student Name:

1- Mirza Abdulla Hasan
2- Ali Mohammed Ahmed
3- Mohammed Jaffer

Student ID:

1- 20157002
2- 20164775
3- 20167313

Supervisor(s) Name:

1- Hosni M Zubair