

ENGG1811 Assignment 2: Simulation and Design of Biofuel Production

- **Due date:** 5pm, Friday of Week-13.
- **Late Penalty:** Late submissions will be penalised at the rate of **10% per day** (including weekends). The penalty applies to the maximum available mark. For example, if you submit 2 days late, maximum available marks is 80% of the assignment marks. Submissions will **not** be accepted after 5pm Tuesday of Week-14.
- You need to work in a **group of two** with the restriction that your group partner must come from the **same lab class** (i.e. same lab time slot and lab room). You must register the pair with your tutor no later than the Week-11 lab class. If you want to work on your own, please check with your tutor.

Change log :

- **05:35am Mon 21 May:** Please download the following updated files:
 - `set1_check.pickle` (diff should be now zero or very low, say less than 10^{-4})
 - `set2_check.pickle` (diff should be now zero or very low, say less than 10^{-4})
 - `test_2B.py` (in "import", design.py changed to design)
- **10:35am Wed 16 May:** Test files for 2A and 2B are now available: `test_2A.py` and `test_2B.py`
- **09:20am Tue 15 May** (changes marked with light-cyan background)
 - Due date is 5pm Friday of Week-13.
 - In part 2A and 2B, 'alpha_b' and 'alpha_a' should be replaced by 'alpha_b_array' and 'alpha_p_array' respectively.
 - The following updated files are now available:
 - `test_1A_1B.py`
 - `test_2A.py`
 - `test_2B.py`

Introduction

We often think bacteria are bad. The truth is that there are many different types of bacteria in this world. Some bacteria are harmful to humans but some bacteria in our bodies help us to live. Have you ever considered the possibility that bacteria can also be "factory workers"? Engineers and scientists are working on using bacteria to produce certain chemicals and materials. An example is to use bacteria to produce fuel for us. In engineering, we often want to optimise the process, so we may want to make the bacteria to produce as much fuel as possible in a given time. However, there are often constraints in nature. The truth is that fuel is toxic to bacteria, so we need to find a way for the bacteria to make a lot of fuel but at the same time keep them alive! This biofuel production process is the theme of this assignment.

The aim of this assignment is to give you an opportunity to work on a small-scale engineering design problem in python. The engineering system that you will be working on is biofuel production. Your goal is to determine the design parameters so that the bacteria can produce as much fuel as possible while respecting a couple of constraints. You will use simulation as part of the design process.

For this assignment, you need to work in a **group of two** with the restriction that your group partner must come from the **same lab class** (i.e. same lab time slot and lab room). If you want to work on your own, please check with your tutor.

Learning objectives

This assignment is designed to give you practice in

Engg1811 Assignment Solution

Huangqi Zhang



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