1 PE 3013 - Exam 5

Open Book, open notes, closed neighbor; no cell phones or internet access until you complete the exam. Save you file as ***Your_Name_Exam5.xls*** *and e-mail the results to lgt@utulsa.edu;* ***copy yourself*** *to make sure that the attachment came.* **Save your file before you try to run or debug! See Exam5_Template.xls.**

The pressure derivative is a powerful diagnostic tool for analyzing pressure transient data. Unfortunately, unlike pressure, the pressure derivative is not measured; it must be computed from measurements of pressure versus time. Here, we describe the Bourdet algorithm for generating smooth pressure derivative data from measured pressure data.

Suppose we have N measured pressure versus time data points. Let $\{t_i, \Delta p_i\}_{i=1}^{N}$ denote the set of measured pressure versus time data points. The procedure for computing $\Delta p'_i$ (the pressure derivative at t_i) is given by,

$$\Delta p'_i = \frac{t_i}{(t_i - t_{i-1}) + (t_{i+1} - t_i)} \left[\frac{\Delta P_i - \Delta P_{i-1}}{(t_i - t_{i-1})}(t_{i+1} - t_i) + \frac{\Delta P_{i+1} - \Delta P_i}{(t_{i+1} - t_i)}(t_i - t_{i-1}) \right] \tag{1}$$

Note that Eq. 1 applies for $i = 2$ to $N - 1$, so we cannot compute $\Delta p'_1$ and $\Delta p'_N$ using this approach.

Your tasks are as follows:

- Write button code to read in user provided arrays of time and pressure drop data (see Template file.)
- Write a subroutine that takes arrays of time and pressure and computes the derivative data at points 2 through $N - 1$.