

図 8.6 プログラムの全体 の訂正
(アップロードされている Excel ファイルは訂正済みです)

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Option Explicit
Dim CHP1 As Double, CHP As Double, kHP As Double
Dim CP1 As Double, CP As Double, kP As Double
Dim kPHP As Double
Dim t As Double, tw As Double, tw0 As Double, tm As Double, dt As Double
Dim i As Integer
                                グローバル関数の定義

Sub ZVI()
    kHP = Cells(2, 3)
    kP = Cells(3, 3)
    kPHP = Cells(4, 3)
    CHP1 = Cells(5, 3)
    CP1 = Cells(6, 3)
    } 数値の読み込み

    tm = 200
    dt = tm / 1000
    tw0 = tm / 50
    } 計算時間、刻み時間、結果の書き込み頻度の設定

    CHP = CHP1
    CP = CP1
    t = 0
    tw = 0
    i = 0
    } 初期値の設定

    Range(Cells(8, 2), Cells(58, 4)).Clear  前回の計算結果の消去

    Do
        If tw <= t Then
            Cells(8 + i, 2) = t
            Cells(8 + i, 3) = CHP
            Cells(8 + i, 4) = CP
            tw = tw + tw0
            i = i + 1
        } 結果の書出し (指定した間隔ごと)

        Rungekutta ← 微分方程式を解く

        t = t + dt
        t = Round(t, 1)

        If (CHP <= 0# Or CP <= 0#) Then Exit Do

    Loop Until t > tm + 1

End Sub

Sub Rungekutta()
    Dim dCHPd1 As Double, dCPd1 As Double
    Dim dCHPd2 As Double, dCPd2 As Double
    Dim dCHPd3 As Double, dCPd3 As Double
    Dim dCHPd4 As Double, dCPd4 As Double

    dCHPd1 = fHP(CHP)
    dCPd1 = fP(CP, CHP)

    dCHPd2 = fHP(CHP + dCHPd1 / 2 * dt)
    dCPd2 = fP(CP + dCPd1 / 2 * dt, CHP)

    dCHPd3 = fHP(CHP + dCHPd2 / 2 * dt)
    dCPd3 = fP(CP + dCPd2 / 2 * dt, CHP)

    dCHPd4 = fHP(CHP + dCHPd3 * dt)
    dCPd4 = fP(CP + dCPd3 * dt, CHP)

    CHP = CHP + (dCHPd1 + dCHPd2 * 2 + dCHPd3 * 2 + dCHPd4) / 6 * dt
    CP = CP + (dCPd1 + dCPd2 * 2 + dCPd3 * 2 + dCPd4) / 6 * dt

End Sub

Function fHP(CHPf As Double)
    fHP = -kHP * CHPf → 解きたい微分方程式 (dCHP/dt = )
End Function

Function fP(CPf As Double, CHPf)
    fP = -kP * CPf - kPHP * (CHPf) ^ 2 → 解きたい微分方程式 (dCP/dt = )
End Function

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CHP を $CHP + dCHPd1 / 2 * dt$ に訂正

CHP を $CHP + dCHPd2 / 2 * dt$ に訂正

CHP を $CHP + dCHPd3 * dt$ に訂正

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