CIE DELTA-E 2000
VBA code implementation


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Function DE00(L1, A1, B1, L2, A2, B2)
Dim C1 As Variant, C2 As Variant, Cab As Variant, G As Variant,
aP1 As Variant, aP2 As Variant, CP1 As Variant
Dim CP2 As Variant, hP1 As Variant, hP2 As Variant, DLP As
Variant, DCP As Variant, DhP As Variant, Degrees As Variant
Dim DelHp As Variant, Lbar As Variant, Cbar As Variant, hbar As
Variant, T As Variant, DelTheta As Variant, RC As Variant
Dim SL As Variant, Sc As Variant, Sh As Variant, RT As Variant,
kL As Variant, kC As Variant, kH As Variant, radians As Variant
'set kL, kC and kH to 1.0
'**************************************
Application.ScreenUpdating = False
kL = 1#: kC = 1#: kH = 1#
radians = Application.WorksheetFunction.Pi() / 180
Degrees = 1 / radians
'calculate c1,c2,h1,h2
'*****************************************
C1 = Sqr(A1 ^ 2 + B1 ^ 2)
C2 = Sqr(A2 ^ 2 + B2 ^ 2)
Cab = (C1 + C2) / 2
G = 0.5 * (1 - Sqr(Cab ^ 7 / (Cab ^ 7 + 25 ^ 7)))
aP1 = (1 + G) * A1
aP2 = (1 + G) * A2
CP1 = Sqr(aP1 ^ 2 + B1 ^ 2)
CP2 = Sqr(aP2 ^ 2 + B2 ^ 2)
If (B1 = 0 And aP1 = 0) Then
    hP1 = 0
Else
    hP1 = Degrees * (Application.WorksheetFunction.Atan2(aP1,
B1))
    If hP1 < 0 Then
        hP1 = hP1 + 360
    End If
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    End If

    If (B2 = 0 And aP2 = 0) Then
        hP2 = 0
    Else
        hP2 = Degrees * (Application.WorksheetFunction.Atan2(aP2,
    B2))
        If hP2 < 0 Then
            hP2 = hP2 + 360
        End If
    End If
    'calculate Delta L',Delta C',Delta h',Delta H'
    **************************************
    DLP = L2 - L1
    DCP = CP2 - CP1
    If CP1 * CP2 = 0 Then
        DhP = 0
    ElseIf (Abs(hP2 - hP1) <= 180) Then
            DhP = hP2 - hP1
    ElseIf (hP2 - hP1) > 180 Then
            DhP = hP2 - hP1 - 360
    Else
        DhP = hP2 - hP1 + 360
    End If
    DelHp = 2 * Sqr(CP1 * CP2) * Sin(radians * (DhP / 2))
    'calculate DE 2000' **************************************

     Lbar = (L1 + L2) / 2
     Cbar = (CP1 + CP2) / 2
     If (CP1 * CP2 = 0) Then
        hbar = (hP1 + hP2)
    ElseIf (Abs(hP1 - hP2) <= 180) Then
        hbar = (hP1 + hP2) / 2
    ElseIf (Abs(hP1 - hP2) > 180 And hP1 + hP2 < 360) Then
        hbar = (hP1 + hP2 + 360) / 2
    Else
        hbar = (hP1 + hP2 - 360) / 2
    End If
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T = 1 - 0.17 * Cos(radians * (hbar - 30)) + 0.24 * Cos(radians * (2 *
hbar)) + 0.32 * Cos(radians * (3 * hbar + 6)) - 0.2 * Cos(radians * (4
* hbar - 63))
DelTheta = 30 * Exp(-((hbar - 275) / 25) ^ 2)
RC = 2 * Sqr(Cbar ^ 7 / (Cbar ^ 7 + 25 ^ 7))
SL = 1 + (0.015 * (Lbar - 50) ^ 2) / Sqr(20 + (Lbar - 50) ^ 2)
Sc = 1 + 0.045 * Cbar
Sh = 1 + 0.015 * Cbar * T
RT = -Sin(radians * 2 * DelTheta) * RC
DE00 = Sqr((DLP / (kL * SL)) ^ 2 + (DCP / (kC * Sc)) ^ 2 + (DelHp /
(kH * Sh)) ^ 2 + RT * (DCP / (kC * Sc)) * (DelHp / (kH * Sh)))
End Function
```