

# Implicit Runge-Kutta methods for two-point boundary value problems

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```
def RK4sys(fcn, a, b, y0, N):
    """
    Solve y' = f(x,y) on the interval [a,b] in
    'N' steps for a system of differential
    equations using fourth-order Runge-Kutta with
    initial condition y[a] = y0 where 'y0' is a
    vector.
    """
    h = (b - a) / N
    x = a + np.arange(N+1) * h
    y = np.zeros((x.size, y0.size))
    y[0, :] = y0
    for k in range(N):
        k1 = fcn(x[k], y[k, :])
        k2 = fcn(x[k] + h/2, y[k, :] + h * k1 / 2)
        k3 = fcn(x[k] + h/2, y[k, :] + h * k2 / 2)
        k4 = fcn(x[k] + h, y[k, :] + h * k3)
        y[k+1, :] = y[k, :] + h * (k1 + 2
                                * (k2 + k3) + k4) / 6
    return x, y
```

Description: -

-  
Soils -- Florida -- Collier County -- Maps.  
Soil surveys -- Florida -- Collier County.  
Cyprus -- Politics and government  
Africa, Central -- Economic conditions  
Sudan (Region) -- Economic conditions  
Secularization -- Sudan (Region) -- History  
Boundary value problems -- Numerical solutions  
Runge-Kutta formulas  
Implicit Runge-Kutta methods for two-point  
boundary value problems  
-Implicit Runge-Kutta methods for two-point boundary value  
problems

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Tags: #The #Application #of #Implicit #Runge

## Efficient classes of Runge

A number of studies have explored the use of asymptotically correct defect estimates in the numerical solution of initial value ODEs IVODEs.

## A high order method for the numerical solution of two

The front instability sets in when the order of the reaction,  $m$ , exceeds some threshold,  $m_c$ , that depends on the inverse of the Lewis number,  $Le$ . A theoretical examination of the new scheme for large systems of equations shows that for a given mesh size it generally requires about twice as much work as the Keller box scheme. It is well-known that the use of collocation at Gauss points leads to solution approximations at the mesh points for which the global error is  $O(h^{2k})$ , where  $k$  is the number of collocation points used per subinterval and  $h$  is the subinterval size.

## Mono

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## A high order method for the numerical solution of two

In this paper we derive an efficient implementation of this formula which is applicable when the given boundary conditions are non-separated. In following sections, we consider a family of Runge--Kutta methods. He explored three main schemes, called now the midpoint method, the Heun method, and the trapezoid rule.

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