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Aerodynamics and propulsion

Q1. Result for step-size:0.03

values of derivatives are

forward_1st_order = -6.38207600

forward_2nd_order = -4.37213600

backward_1st_order = -2.49827600

backward_2nd_order = -4.27493600

central_1st_order = -4.44017600

central_2nd_order = -4.40129600

value of errors are :

forward first order error = 1.98207600

forward 2nd order error = 0.02786400

backward first order error = 1.90172400

backward 2nd order error = 0.12506400

backward 2nd order error = 0.12506400

central first order error = 0.04017600

central 2nd order error = 0.00129600

Result for step-size : 0.06

values of derivatives are

forward_1st_order = -8.39201600

forward_2nd_order = -4.53737600

backward_1st_order = -0.72161600

backward_2nd_order = -3.75977600

central_1st_order = -4.55681600

central_2nd_order = -4.42073600

value of errors are :

forward first order error = 3.99201600

forward 2nd order error = 0.13737600

backward first order error = 3.67838400

backward 2nd order error = 0.64022400

backward 2nd order error = 0.64022400

central first order error = 0.15681600

central 2nd order error = 0.02073600

Result for step-size : 0.09

values of derivatives are

forward_1st_order = -10.36955600

forward_2nd_order = -5.35061600

backward_1st_order = 0.89304400

backward_2nd_order = -2.72621600

central_1st_order = -4.73825600

central_2nd_order = -4.50497600

value of errors are :

forward first order error = 5.96955600

forward 2nd order error = 0.95061600

backward first order error = 5.29304400

backward 2nd order error = 1.67378400

backward 2nd order error = 1.67378400

central first order error = 0.33825600

central 2nd order error = 0.10497600

Q2. Result foe Q2 ~~~~~

Sl.no.	y	V
1	0.00	0.000000
2	0.00	0.287000
3	0.01	0.899000
4	0.01	1.915000

5	0.02	3.048000
6	0.02	4.299000
7	0.00	0.000000

value of dv/dy at y=0 is:

140.33333333

The shear stress T (N/m2)at the surface (y = 0) is

0.00252600