# Continuous Time Transfer function - Lead/Lag:

implies it is a lead controller, implies a lag controller.

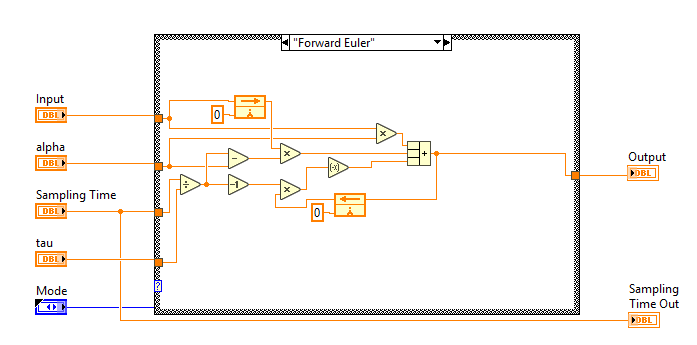
# Forward Euler

Substituting,

We get,

Converting to difference equations,

Using the time-shift property, taking to the right-hand side,

**LabVIEW implementation:**

# Backward Euler

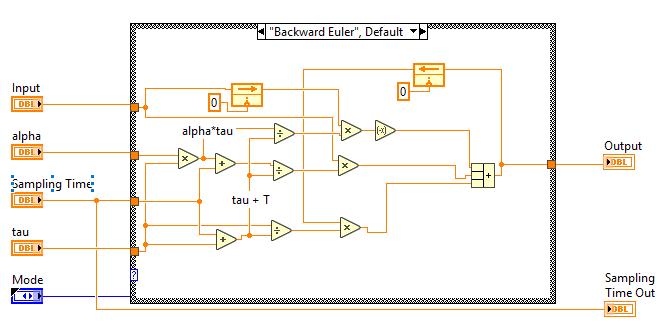
Substituting,

We get,

Converting to difference equations,

Using the time-shift property, taking to the right-hand side,

**LabVIEW implementation:**



# Trapezoidal / Bi-linear / ‘Tustin’

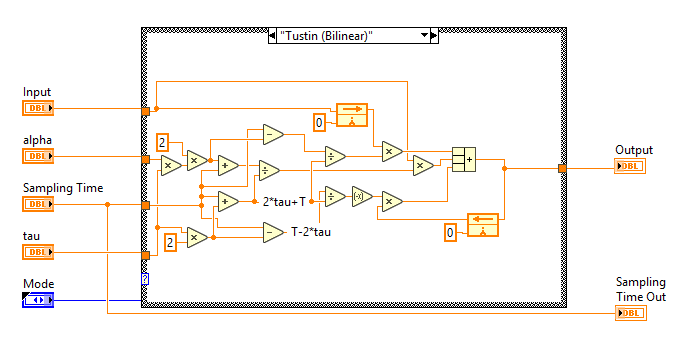
Substituting,

We get,

Converting to difference equations,

Using the time-shift property, taking to the right-hand side,

**LabVIEW implementation:**



# Continuous Time Transfer function - Integrator:

# Forward Euler

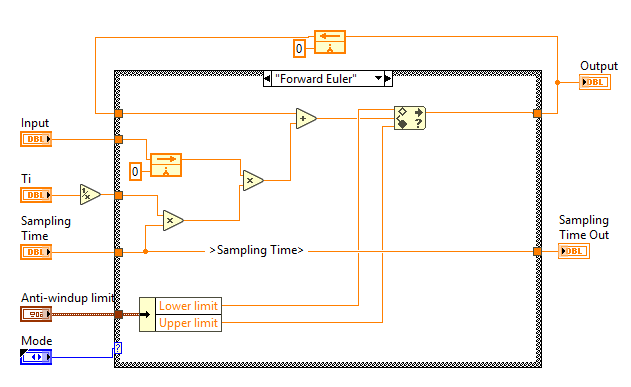
Substituting,

We get,

Converting to difference equations,

Using the time-shift property, taking to the right-hand side,

**LabVIEW implementation (with anti-windup):**



# Backward Euler

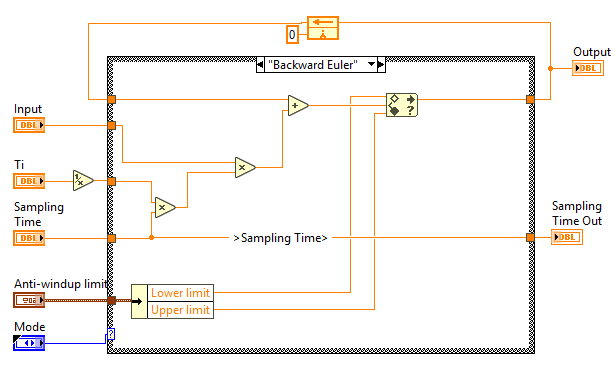
Substituting,

We get,

Converting to difference equations,

Using the time-shift property, taking to the right-hand side,

**LabVIEW implementation (with anti-windup):**



# Trapezoidal / Bi-linear / ‘Tustin’

Substituting,

We get,

Converting to difference equations,

Using the time-shift property, taking to the right-hand side,

**LabVIEW implementation (with anti-windup):**

