Attitude Control

```
domain = "Signal";
displayName = "AttitudeControl";
brief = "Attitude control unit for an aircraft";
componentType = "ComponentSignal";
author = "Petter Krus <petter.krus@liu.se>";
affiliation = "Division of Fluid and Mechatronic Systems, Linköping University";
SetFilenames[defaultPath, domain, displayName];
ResetComponentVariables[];
```

```
inputVariables = {
   {phiref, 0., double, "rad", "Reference signal roll"},
   {thetaref, 0., double, "rad", "Reference signal tip"},
   {psiref, 0., double, "rad", "Reference signal yaw"},
   {phimax, 1., double, "rad", "Maximum bank angle for turn"},
   {phi, 0., double, "rad", "roll angle"},
   {theta, 0., double, "rad", "tipp angle"},
   {psi, 0., double, "rad", "yaw angle"},
   {beta, 0., double, "rad", "side slip angle"},
   {Qb, 0., double, "rad/s", "tip angle rate"},
   {Rb, 0., double, "rad/s", "yaw angle rate"},
   {Ub, 0., double, "m/s", "actual speed"}};
```

```
inputParameters = {
   {Kphi, 3., double, "rad", "Gain roll"},
   {Kphipsi, 2., double, "rad", "Gain yaw/roll"},
   {Kelev, 4., double, "rad", "Gain tip, default"},
   {Kdelev, 1., double, "rad", "Gain tip, default"},
   {Krud, 1., double, "rad", "Gain yaw, default"},
   {Kdrud, 1., double, "", "Gain yaw rate, default"},
   {u1min, -.9, double, "rad", "Minium output signal roll"},
   {u1max, .9, double, "rad", "Maximum output signal roll"},
   {u2min, -.7, double, "rad", "Minium output signal tip"},
   {u2max, .7, double, "rad", "Maximum output signal tip"},
   {u3min, -.7, double, "rad", "Minium output signal yaw"},
   {u3max, .7, double, "rad", "Maximum output signal yaw"},
   {U0, 100., double, "m/s", "Reference speed for compensation"}
  };
```

```
outputVariables = {
   {uaerL, 0., double, "rad", "left aerleron"},
   {uaerR, 0., double, "rad", "right aerleron"},
   {uelev, 0., double, "rad", "elevator"},
   {urud, 0., double, "rad", "rudder"}};
```

```
localExpressions = {
                   U0^2
   Kv == ------------------------,
         U0^2 + Abs[Ub^2]
   u1cmin == Kv u1min,
   u1cmax == Kv u1max,
   u2cmin == Kv u2min,
   u2cmax == Kv u2max,
   u3cmin == u3min,
   u3cmax == u3max
  };
```

```
yaerexpr   =
  Kv Kphi (diffAngle[phiref, phi] + limit[Kphipsi diffAngle[psiref, psi], -phimax, phimax]) ;
yelevexpr  = Kv Kelev (diffAngle[thetaref, theta]) - Kv Kdelev Qb;
yrudexpr   = - Krud beta - Kv Kdrud Rb;
```

```
expressions = {
       uaerL == limit[yaerexpr, u1cmin, u1cmax],
       uaerR == limit[-yaerexpr, u1cmin, u1cmax],
       uelev == limit[-yelevexpr, u2cmin, u2cmax],
       urud == limit[yrudexpr, u3cmin, u3cmax]
  };
```

```
Compgen[file]
```