In[1]:=
```
w21 = w; w12 = 0;
(* States are 11, 12, 22, 1|2. *)
```

$$Q = \begin{pmatrix} -2\,w21 - cA & 2\,w21 & 0 & cA \\ w12 & -w21 - w12 & w21 & 0 \\ 0 & 2\,w12 & -2\,w12 - cC & cC \\ 0 & 0 & 0 & 0 \end{pmatrix};$$

```
EigenRoot = Eigenvalues[Q]

U = Transpose[Eigenvectors[Q]];
V = Simplify[Inverse[U]];

Simplify[U.V];
Ptau = Simplify[U.DiagonalMatrix[Exp[EigenRoot * tauAB]].V];
Ptau〚1〛
P1 = Ptau〚1, 1〛; P2 = Ptau〚1, 2〛; P3 = Ptau〚1, 3〛; P4 = Ptau〚1, 4〛;

P1 / 3 + P2 * Exp[-2 / thetaAB * (tauABC - tauAB)] / 3
 + P3 * (1 - 2 / 3 * Exp[-2 (tauABC - tauAB) / thetaC]) + P4
```

Out[3]= $\{0, -cC, -cA - 2\,w, -w\}$

Out[8]= $$\left\{e^{-tauAB\,(cA+2\,w)},\ -\frac{2\,e^{-tauAB\,w}\left(-1+e^{-tauAB\,(cA+w)}\right)w}{cA+w},\right.$$
$$\frac{2\,w^2\left(e^{-tauAB\,(cA+2\,w)}\,(cC-w)-e^{-cC\,tauAB}\,(cA+w)+e^{-tauAB\,w}\,(cA-cC+2\,w)\right)}{(cC-w)\,(cA+w)\,(cA-cC+2\,w)},$$
$$\left.1-\frac{2\,e^{-cC\,tauAB}\,w^2}{(-cA+cC-2\,w)\,(cC-w)}-\frac{2\,cC\,e^{-tauAB\,w}\,w}{(cC-w)\,(cA+w)}-\frac{e^{-tauAB\,(cA+2\,w)}\left(cA^2+cC\,w+cA\,(-cC+w)\right)}{(cA+w)\,(cA-cC+2\,w)}\right\}$$

Out[10]=
$$\frac{1}{3}\,e^{-tauAB\,(cA+2\,w)}-\frac{2\,e^{-\frac{2\,(-tauAB+tauABC)}{thetaAB}-tauAB\,w}\left(-1+e^{-tauAB\,(cA+w)}\right)w}{3\,(cA+w)}$$

Out[11]=
$$1-\frac{2\,e^{-cC\,tauAB}\,w^2}{(-cA+cC-2\,w)\,(cC-w)}-\frac{2\,cC\,e^{-tauAB\,w}\,w}{(cC-w)\,(cA+w)}-\frac{e^{-tauAB\,(cA+2\,w)}\left(cA^2+cC\,w+cA\,(-cC+w)\right)}{(cA+w)\,(cA-cC+2\,w)}+$$
$$\frac{2\left(1-\frac{2}{3}\,e^{-\frac{2\,(-tauAB+tauABC)}{thetaC}}\right)w^2\left(e^{-tauAB\,(cA+2\,w)}\,(cC-w)-e^{-cC\,tauAB}\,(cA+w)+e^{-tauAB\,w}\,(cA-cC+2\,w)\right)}{(cC-w)\,(cA+w)\,(cA-cC+2\,w)}$$

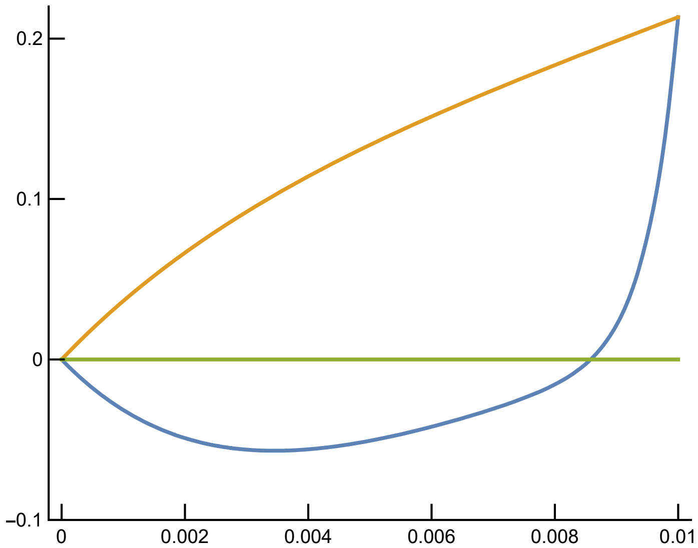
```
In[12]:= gdiJ[MCA_, tauABC_, tauAB_, thetaA_, thetaC_, thetaAB_] := Block[{cA, cC, w},
    cA = 2 / thetaA; cC = 2 / thetaC; w = 4 MCA / thetaA;
    P1 = e^(-tauAB (cA+2 w));
    P2 = - (2 e^(-tauAB w) (-1 + e^(-tauAB (cA+w))) w) / (cA + w);
    P3 = (2 w^2 (e^(-tauAB (cA+2 w)) (cC - w) - e^(-cC tauAB) (cA + w) + e^(-tauAB w) (cA - cC + 2 w))) / ((cC - w) (cA + w) (cA - cC + 2 w));
    P4 = 1 - P1 - P2 - P3;
    (* Print[{P1,P2,P3,P4}]; *)
    PG1 = P1 / 3 + P2 * Exp[-2 / thetaAB * (tauABC - tauAB)] / 3 +
      P3 * (1 - 2 / 3 * Exp[-2 (tauABC - tauAB) / thetaC]) + P4;
    (PG1 - 1 / 3) * (3 / 2)
   ];
P4gdi[MCA_, tauABC_, tauAB_, thetaA_, thetaC_, thetaAB_] := Block[{cA, cC, w},
    cA = 2 / thetaA; cC = 2 / thetaC; w = 4 MCA / thetaA;
    P1 = e^(-tauAB (cA+2 w));
    P2 = - (2 e^(-tauAB w) (-1 + e^(-tauAB (cA+w))) w) / (cA + w);
    P3 = (2 w^2 (e^(-tauAB (cA+2 w)) (cC - w) - e^(-cC tauAB) (cA + w) + e^(-tauAB w) (cA - cC + 2 w))) / ((cC - w) (cA + w) (cA - cC + 2 w));
    P4 = 1 - P1 - P2 - P3
   ];
```

In[∘]:=
```
MCA = 1;  tauABC = 0.01;
tauAB = 0.005;
thetaA = 0.05;  thetaC = 0.05;  thetaAB = 0.001;

Plot[{gdiJ[MCA, tauABC, tauAB, thetaA, thetaC, thetaAB],
   P4gdi[MCA, tauABC, tauAB, thetaA, thetaC, thetaAB], 0},
  {tauAB, 0, tauABC}, Frame → {{True, False}, {True, False}},
  FrameStyle → Directive[AbsoluteThickness[Medium], Black, 10],
  FrameTicks → {{{0, 0, .025}, {0.002, 0.002, .025}, {0.004, 0.004, .025},
     {0.006, 0.006, .025}, {0.008, 0.008, .025}, {0.01, 0.01, .025}},
    {{-0.1, -0.1, .025}, {0, 0, .025}, {0.1, 0.1, .025}, {0.2, 0.2, .025}}},
  PlotRange → {-0.1, 0.22},  AxesOrigin → {0, -0.1}, AspectRatio → .8]

Plot[{gdiJ[MCA, tauABC, tauAB, thetaA, thetaC, thetaAB],
   P4gdi[MCA, tauABC, tauAB, thetaA, thetaC, thetaAB], 0},
  {MCA, 0, 2}, Frame → {{True, False}, {True, False}},
  FrameStyle → Directive[AbsoluteThickness[Medium], Black, 12], FrameTicks →
   {{{0, 0, .025}, {0.5, 0.5, .025}, {1, 1, .025}, {1.5, 1.5, .025}, {2, 2, .025}},
    {{-0.1, " ", .025}, {0, "", .025}, {0.1, " ", .025}, {0.2, " ", .025}}},
  PlotRange → {-0.1, 0.22},  AxesOrigin → {0, -0.1}, AspectRatio → .8]
```

Out[∘]=



Out[∘]=