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Link4 tester　ver.1

4節リンクシミュレータ

以下の機能を持つ

1. *構成モードでリンクの長さや節点位置を変更できる*
2. *シミュレーションモードで駆動リンクを動かすことができる*
3. *取り消しモードで初期リンクに戻すことができる*
4. *ビームの長さは基本単位の整数倍である。初期値はビームの長さが1,基本単位はその1/5である*
5. *リンク先端をトレースすることができる*
6. *計算精度が不十分の場合には節点が赤くなる*
7. *リンク構成をファイルにセーブ・ロードできる*

In[697]:=
```
ClearAll["Global`*"];
$IterationLimit = 20;
worksize = 400;
baseUnit = bU = 1.;
partition = 1 / 5;
psize = bU * partition;
(*Off[FindRoot]*)
(* find a cross point between the circle centerd q1 and the circle centerd q2, where
 f: initial guess, q1: point-1, q2: point-2, r1: radius of q1, r2: radiau of q2 *)
rf[{f_, q1_, q2_}, {r1_, r2_}] := (
    z = {};
    {{x, y} /. Check[FindRoot[{(x - q1[[1]]) ^ 2 + (y - q1[[2]]) ^ 2 == r1 ^ 2, (x - q2[[1]]) ^ 2 +
            (y - q2[[2]]) ^ 2 == r2 ^ 2}, {{x, f[[1]]}, {y, f[[2]]}}], z = Red; {x, y} → f], z});
exsave[data_] := Put[data, FileNameJoin[{NotebookDirectory[], "link-data.txt"}]];
exload := Get[FileNameJoin[{NotebookDirectory[], "testfile"}]];

reset = xload = xsave = False; trace = {}; last = {}; lbl = "⇧";
mstyle = {Appearance -> "Palette", BaselinePosition → Center};
menu = Row[{
     Row[{SetterBar[Dynamic[mode],
         {construct → "⛭", simulate → "▷"}, BaseStyle → {FontSize → 20}, mstyle],
       Button["⊡", mode = construct; reset = True, BaseStyle → {FontSize -> 22}, mstyle],
       ActionMenu["f", {Save :→ (xsave = True), Load :→ (exload[gload]; xload = True)},
        BaseStyle → {FontSize → 18}, mstyle, Enabled → Dynamic[mode == construct]],
       Button[Dynamic@lbl, If[lbl == "⇧", pencil = True; lbl = "⇣",
         pencil = False; lbl = "⇧"], BaseStyle → {FontSize → 22}, mstyle]}],

     DynamicModule[{t},
      Animate[
       If[ControlActive[True, False],
        If[pencil,
         If[last ≠ out, AppendTo[trace, Point[out]]; last = out], trace = {}; last = {}]];
       pt = {Sin[t], Cos[t]};
       Deploy@Graphics[{Circle[], Locator[Dynamic[pt, (pt = Normalize[#]) &]]},
         PlotRange → 1.2, ImageSize → 60], {t, 0, 2 Pi, Pi / 20},
       AnimationRunning → False, ControlPlacement → Right, LabelStyle → Opacity[0]]],
    Spacer[4]];

DynamicModule[
 {p1 = {0, 0}, p2 = {0, bU}, p3 = {bU, 0},
  p4 = {bU, bU}, p5 = {1.5 bU, bU}, p6 = {bU, 1.5 bU}},

 g = Dynamic[Switch[mode,
     construct, (
      locatorStatus = True;
      If[reset, {p1, p2, p3, p4, p5, p6} =
        {{0, 0}, {0, bU}, {bU, 0}, {bU, bU}, {1.5 bU, bU}, {bU, 1.5 bU}}; reset = False];
```

```
    If[xload, {p1, p2, p3, p4, p5, p6} = exload; xload = False];
    If[xsave, exsave[{p1, p2, p3, p4, p5, p6}]; xsave = False];
    {r1, r2, r3, r4, r5, r6} =
     Map[Round[Norm[#], psize] &, {p1 - p2, p3 - p4, p2 - p4, p2 - p5, p3 - p6, p1 - p3}];
    {ReleaseHold@Map[Locator[Dynamic[#], Enabled → locatorStatus] &,
       {Hold@p1, Hold@p2, Hold@p3, Hold@p4, Hold@p5, Hold@p6}],
     Map[Line, {{p1, p2}, {p3, p6}, {p2, p5}, {p1, p3}}]}),
   simulate, (
    locatorStatus = False;
    p2 = r1 * pt + p1;
    {p4, st2} = rf[{p4, p2, p3}, {r3, r2}];
    out = p5 = r4 / r3 (p4 - p2) + p2;
    p6 = r5 / r2 (p4 - p3) + p3;
    {Locator[p1, Background → Green], Locator[p2], Locator[p3],
     Locator[p4, Background → Dynamic@st2], Locator[p5], Locator[p6],
     Line[{p1, p2}], Line[{p3, p6}], Line[{p2, p5}], Line[{p1, p3}]})
  ]
 ];

targetpain = Framed@Deploy@Graphics[{g, Dynamic@trace},
    ImageSize → {1.8 worksize, worksize}, PlotRange → {{-1 bU, 3 bU}, {-1 bU, 2 bU}}];
Framed@Column[{menu, targetpain}]]
```