In[1]:=
```
Framed@Panel[Manipulate[Framed[Panel[Column[{Framed[Dynamic@Show[If[start,
processM[CurrentImage[], startget, zuobiao0], Image[Table[0, {240}, {320}]]]
, ImageSize -> 300]],
Dynamic[viewzuobiao[dynamiczuobiao, {}]]}], Background -> White],
    FrameStyle -> GrayLevel[0.6]],
Item[ Row[{ " ", Style["垂直摆倾斜仪数据采集与分析系统", {Red, Bold, 20}], " "},
     Spacer[225]] ,
    ControlPlacement -> Top],
Delimiter,
Item["", ControlPlacement -> Right],
Item[Row[{"", Grid[{{Button[Style["检查CCD"],
If[! start, CreateDialog[CurrentImage[]]],
           Method -> "Queued", ImageSize -> {100, 30}],
          Button[Style["调整仪器"],
If[! start,
CreateWindow[DialogNotebook[
(Manipulate[
Framed[Dynamic@Show[imgt, ImageSize -> 400]],
Item[Style["仪器调整与k值的侧量", {17, Blue}], ControlPlacement -> Top],
Delimiter,
Item[Row[{"", Column[{Button[Style["拍摄"],
                       imgt := CurrentImage[], ImageSize -> {150, 25}],
                      Button[Style["拍照"], imgt = CurrentImage[],
                       ImageSize -> {150, 25}]}]},
                  Spacer[30]], ControlPlacement -> Right],
Delimiter,
Item[Style["k值的测量\n", {15, Bold}], ControlPlacement -> Right],
Item[Column[{Control[{{p, {{0, 0}, {0, 0}}, "p"}}],
Control[{{l, 0, "l"}}]
}, Spacings -> 3, Frame -> All,
                  FrameStyle -> GrayLevel[0.6]], ControlPlacement -> Right],
Item[Column[{Row[{"", Button[Style["计算", {Red, 15}], (If[l != 0,
                        k = Norm[p[[1]] - p[[2]]] / l]),
                       ImageSize -> {150, 30}], ""}, Spacer[30]],
Row[{"", Dynamic[Style[
                        StringForm["k= `1`", NumberForm[k, {8, 4}]], {Red, 15}]], ""},
                    Spacer[50]]}, Spacings -> 2, Frame -> All,
                  FrameStyle -> GrayLevel[0.6]],
                 ControlPlacement -> Right],
Initialization :> (imgt := CurrentImage[])])
], WindowTitle -> "仪器调整与k值的侧量", WindowSize -> All
]], Method -> "Queued", ImageSize -> {100, 30}],
Dynamic@
           If[! start, Button[Style["开始拍摄"], start = True, ImageSize -> {100, 30}],
Button[Style["停止拍摄"], start = False; dynamiczuobiao = {0, 0}; zuobiao0 = {-1, -1}
, ImageSize -> {100, 30}]]}, {Button[Style["获取初始照片"],
If[! startget, CreateDialog@
             Module[{img}, img = CurrentImage[]; zuobiao0 = graygetzuobiao1[img];
Column[{Show[img, Graphics[{Red, Dashed, Line[{{0, zuobiao0[[2]]},
                       {320, zuobiao0[[2]]}}],
                    Line[{{zuobiao0[[1]], 0}, {zuobiao0[[1]], 240}}]}]],
                viewzuobiao[zuobiao0, {}]}]]],
           Method -> "Queued", ImageSize -> {100, 30}],
```

```
          Button[Style["开始监控", {Red}], (startget = True;), ImageSize -> {100, 30}],
          Button[Style["暂停监控", {Red}], (startget = False), ImageSize -> {100, 30}]},
{Row[{Style["k", 15], Framed[Dynamic@InputField[Dynamic[k], FieldSize -> 23],
             FrameStyle -> Black], ""}, Spacer[14]], SpanFromLeft, SpanFromLeft},
{Row[{Row[{Style["S", 15], Framed[Dynamic@InputField[Dynamic[s], FieldSize -> 23],
               FrameStyle -> Black]}, Spacer[14]], Null, Style["厘米", {12}]}],
          SpanFromLeft, SpanFromLeft},
{Row[
           {Style["θm", 15], Framed[Dynamic@InputField[Dynamic[θm], FieldSize -> 23],
             FrameStyle -> Black], Style["分", {12}]}, Spacer[0]],
          SpanFromLeft, SpanFromLeft},
{Row[
           {Style["θM", 15], Framed[Dynamic@InputField[Dynamic[θM], FieldSize -> 23],
             FrameStyle -> Black], Style["分", {12}]}, Spacer[0]],
          SpanFromLeft, SpanFromLeft}}, Spacings -> {{4, 2, 2, 4}, {3, 1, 2, 1, 1, 1, 3}},
Frame -> True, FrameStyle -> GrayLevel[0.5],
       Background -> RGBColor[236 / 255, 236 / 255, 216 / 255],
       Alignment -> Left]}, Spacer[10]], ControlPlacement -> Right],
Item[
    Panel[Grid[{{Dynamic@Labeled[processBa[zuobiao0, dynamiczuobiao, k, s, θm, θM]
, Framed@Style["实时倾斜方向监控表盘", {Orange}], Top] , Dynamic[Refresh[Labeled[
processCh[zuobiao0, dynamiczuobiao, k, s, θm, θM]
, Framed@Style["实时倾斜角监控曲线", {Orange}], Top],  UpdateInterval -> 1  ],
TrackedSymbols -> {}] },
{Dynamic@Framed[processGr[zuobiao0, dynamiczuobiao, k, s], FrameStyle -> Red],
Grid[{{ Dynamic@If[(! startorpause),
Button[Style["开始"],
               startorpause = True, Enabled -> tmpflag, ImageSize -> {70, 25}],
Button[Style["暂停"], startorpause = False, Enabled -> tmpflag, ImageSize -> {70, 25}]]
, Button[Style["数据储存设置"], If[! tmpflag,
CreateWindow[DialogNotebook[{
(Manipulate[
                  Column[{Row[{Style["存储位置: "], InputField[Dynamic[directoryIn],
                       String, FieldSize -> 20],
FileNameSetter[Dynamic[directoryIn], "Directory"]}],
Row[{Style["文件名称: "], InputField[Dynamic[inName], String, FieldSize -> 20]}]}],
Item[Style["数据储存设置", {18, Blue}], ControlPlacement -> Top],
Delimiter,
Item[Grid[{
{Null, "年", "月", "日", "时", "分", "秒"},
{"开始日期", InputField[Dynamic[yearin0],
                        FieldSize -> 5], InputField[Dynamic[monthin0],
                        FieldSize -> 2],
InputField[Dynamic[dayin0], FieldSize -> 2],
                       InputField[Dynamic[hourin0], FieldSize -> 4],
                       InputField[Dynamic[minutein0], FieldSize -> 4],
                       InputField[Dynamic[secondin0], FieldSize -> 4] },
{"结束日期", InputField[Dynamic[yearin1], FieldSize -> 5], InputField[Dynamic[monthin1],
                        FieldSize -> 2], InputField[Dynamic[dayin1], FieldSize -> 2],
                       InputField[Dynamic[hourin1], FieldSize -> 4],
                       InputField[Dynamic[minutein1], FieldSize -> 4],
                       InputField[Dynamic[secondin1], FieldSize -> 4] }
```

```
}, Frame -> True, Spacings -> {Automatic, {2, 1, 1, 2}}  ],
                    ControlPlacement -> Bottom],
Delimiter,
Item[Column[{Row[{
"", Dynamic[Row[{Style["记录频率"],
                          InputField[Dynamic[ups]], "秒记录一次"}]]},
                       Spacer[15]]}, Spacings -> {0, 2, 2}, Frame -> True]
, ControlPlacement -> Bottom]]
), Column[
                  {Row[{Null, Null, Null, Null, Null, Null, DefaultButton[Module[{},
timestartin = AbsoluteTime[{yearin0, monthin0, dayin0, hourin0, minutein0, secondin0}];
timestopin = AbsoluteTime[{yearin1, monthin1, dayin1, hourin1, minutein1, secondin1}];
If[AbsoluteTime[] <= timestartin < timestopin,
Quiet[stmp = OpenAppend[directoryIn <> inName]];
If[! (stmp === $Failed), WriteString[stmp, "{", timestartin]; tmpflag = True;
DialogReturn[CreateDialog["设置成功"]]]]]
], CancelButton[]}, Spacer[30]], Null}] }
], WindowSize -> All, WindowTitle -> "数据储存设置"
], CreateDialog["已经设置完毕"];], ImageSize -> {150, 25}],
Dynamic[Refresh[If[timestartin <= AbsoluteTime[] <= timestopin,
processSave[zuobiao0, dynamiczuobiao,
               stmp, tmpflag, startorpause, stopflag, k, s, θm, θM],
If[AbsoluteTime[] < timestartin, "没到时间", "已过时间"]],
             UpdateInterval -> ups], TrackedSymbols -> {}]},
{Dynamic@
            Button[Style["停止", {Red, Bold}], (Quiet@If[tmpflag && ! startorpause,
If[AbsoluteTime[] < timestopin, WriteString[stmp, ",", InputForm@AbsoluteTime[], "}"],
WriteString[stmp, ",", timestopin, "}"]]; Close[stmp]; tmpflag = False; n = 0]),
             Enabled -> tmpflag, ImageSize -> {70, 25}], Button[Style["数据处理分析"],
CreateWindow[DialogNotebook[
(Manipulate[Row[{
                   Style["数据文件: "], InputField[Dynamic[directoryOut], String,
                    FieldSize -> 20],
FileNameSetter[Dynamic[directoryOut]]}],
                 Item[Style["数据分析", {Blue, 18}],
                  ControlPlacement -> Top],
Delimiter,
Item["", ControlPlacement -> Bottom],
Item[Button["数据属性",
                   Module[{datastmp}, datastmp = OpenRead[directoryOut];
data = ReadList[datastmp, Expression][[1]]; Close[datastmp];
CreateDialog[
Grid[{{"起始时间", DateString[data[[1]]]}, {"终止时间", DateString[data[[-1]]]},
{"数据量", Length[data] - 2}}, Frame -> All], WindowTitle -> "数据信息"]]
, ImageSize -> {150, 25}], ControlPlacement -> Bottom],
Delimiter,
Item[Row[{"",
RadioButtonBar[Dynamic[allorpartOut],
                     {False -> Style["检索全部数据", {Orange, 15}],
                      True -> Style["检索部分数据", {Orange, 15}]}]}, Spacer[10]],
                  ControlPlacement -> Bottom],
Delimiter,
```

```
Item[Grid[{
{Null, "年", "月", "日", "时", "分", "秒"},
{"开始时间", Dynamic@InputField[Dynamic[yearout0],
                        Enabled -> allorpartOut, FieldSize -> 5],
                      Dynamic@InputField[Dynamic[monthout0], Enabled -> allorpartOut,
                        FieldSize -> 2],
Dynamic@InputField[Dynamic[dayout0],
                        Enabled -> allorpartOut, FieldSize -> 2],
                      Dynamic@InputField[Dynamic[hourout0], Enabled ->
                         allorpartOut, FieldSize -> 4],
                      Dynamic@InputField[Dynamic[minuteout0], Enabled ->
                         allorpartOut, FieldSize -> 4],
                      Dynamic@InputField[Dynamic[secondout0], Enabled ->
                         allorpartOut, FieldSize -> 4]},
{"结束时间", Dynamic@InputField[Dynamic[yearout1], Enabled -> allorpartOut,
                        FieldSize -> 5], Dynamic@InputField[Dynamic[monthout1],
                        Enabled -> allorpartOut, FieldSize -> 2],
Dynamic@InputField[Dynamic[dayout1], Enabled -> allorpartOut, FieldSize -> 2],
                      Dynamic@InputField[Dynamic[hourout1],
                        Enabled -> allorpartOut, FieldSize -> 4],
                      Dynamic@InputField[Dynamic[minuteout1], Enabled ->
                         allorpartOut, FieldSize -> 4],
                      Dynamic@InputField[Dynamic[secondout1], Enabled ->
                         allorpartOut, FieldSize -> 4] }
}, Frame -> True, Spacings -> {Automatic, {2, 1, 1, 2}}  ], ControlPlacement -> Bottom],
Delimiter,
Item[Grid[{{Dynamic@If[la,
Button["清空数据", jiaodata = {};
                        xiangdata = {}; la = False, ImageSize -> {150, 25}],
                      Button["检索数据", Module[{dt0, dt1, time0, time1},
time0 = AbsoluteTime[{yearout0, monthout0, dayout0, hourout0, minuteout0, secondout0}];
time1 = AbsoluteTime[{yearout1, monthout1, dayout1, hourout1, minuteout1, secondout1}];
dt0 = data[[1]]; dt1 = data[[-1]];
If[allorpartOut,
Do[If[time0 <= data[[i, 1]] + dt0 <= time1,
jiaodata = Append[jiaodata,
                                {data[[i, 1]] + dt0, data[[i, 2]]}];
xiangdata = Append[xiangdata, {data[[i, 1]] + dt0, data[[i, 3]]}]
], {i, 2, Length[data] - 1}],
Do[jiaodata =
                             Append[jiaodata, {data[[i, 1]] + dt0, data[[i, 2]]}];
xiangdata = Append[xiangdata, {data[[i, 1]] + dt0, data[[i, 3]]}],
{i, 2, Length[data] - 1}]]; If[Length[jiaodata] != 0 && Length[xiangdata] != 0,
la = True]], ImageSize -> {150, 25}]],
Dynamic[
                      If[la, Style["检索成功", {15, Red}], Style["就绪", {15, Red}]]]},
{Button[Style["分析数据", {Bold}],
                      CreateDialog[
                       If[Length[jiaodata] == 0 || Length[xiangdata] == 0, "数据为空",
Grid[{{"倾斜角历史记录", "倾斜方向历史记录"},
                          {DateListPlot[jiaodata,
                            ImageSize -> 400, Joined -> True, PlotRange -> All],
DateListPlot[xiangdata, ImageSize -> 400, Joined -> True, PlotRange -> {0, 360}]}}]]]
, ImageSize -> {150, 25}], SpanFromAbove}}, Spacings -> {{3, 5, 3}, {3, 1, 3}}
```

```
], ControlPlacement -> Bottom]])], WindowSize -> All, WindowTitle -> "数据分析"],
            ImageSize -> {150, 25}], SpanFromAbove }},
         Spacings -> {{2, 2, 4, 2}, Automatic}]}},
      Spacings -> {{5, 5, 3}, {0, 1, 1}}, Frame -> All, FrameStyle -> GrayLevel[0.6]],
     FrameMargins -> {{Automatic, Automatic}, {Automatic, -1}},
     Background -> RGBColor[236 / 255, 233 / 255, 216 / 255]],
    ControlPlacement -> Bottom],
   Paneled -> False,
   Initialization :> (
     yearout0 = monthout0 = dayout0 = hourout0 = minuteout0 = secondout0 = 0;
     yearout1 = monthout1 = dayout1 = hourout1 = minuteout1 = secondout1 = 0;
     yearin0 = monthin0 = dayin0 = hourin0 = minutein0 = secondin0 = 0;
     yearin1 = monthin1 = dayin1 = hourin1 = minutein1 = secondin1 = 0 ;
allorpartIn = False; ups = 10;
     start = False; startget = False; zuobiao0 = {-1, -1};
     dynamiczuobiao = {0, 0}; u = {0}; k = 43.; s = 130; θm = 50; θM = 60; tmpflag = False;
     startorpause = False; stopflag = False; n = 0;
     sound = Play[{Sin[9000 x], Cos[9000 x]}, {x, 0, 0.2}];
     timestartin = AbsoluteTime[];
     timestopin = AbsoluteTime[]; la = False; jiaodata = {}; xiangdata = {};
graygetzuobiao1[img_, L_: 240, l_: 320] := Module[{data, max = 0, zuobiao, k},
data = ImageData[ColorConvert[img, "Grayscale"]];
If[Length[data[[1, 1]]] == 0,
Do[k = data[[m, n]];
         If[k > max, max = k; zuobiao = {n - 1, L - m}], {m, 1, L}, {n, 1, l}],
Do[k = data[[m, n, 1]]; If[k > max, max = k; zuobiao = {n - 1, L - m}], {m, 1, L}, {n, 1, l}]];
Return[zuobiao]];
processM[img_, start_, zuobiao0_: {-1, -1}, L_: 240, l_: 320] := Module[{},
If[start, dynamiczuobiao = graygetzuobiao1[img, L, l];
Show[img,
         Graphics[{{Blue, Line[{{0, dynamiczuobiao[[2]]}, {l, dynamiczuobiao[[2]]}}],
Line[{{dynamiczuobiao[[1]], 0}, {dynamiczuobiao[[1]], L}}]},
{Red, Dashed, Line[{{0, zuobiao0[[2]]}, {l, zuobiao0[[2]]}}],
Line[{{zuobiao0[[1]], 0}, {zuobiao0[[1]], L}}]}]}]],
Show[img,
         Graphics[{Red, Dashed, Line[{{0, zuobiao0[[2]]}, {l, zuobiao0[[2]]}}],
Line[{{zuobiao0[[1]], 0}, {zuobiao0[[1]], L}}]}]]]];
viewzuobiao[zuobiao_, style_] := Style[StringForm["(`1` , `2`)", zuobiao[[1]],
        zuobiao[[2]]], style];
processBa[zuobiao0_, zuobiaot_, k_, S_, θm_, θM_, size_: 240] :=
Module[{x, y, l, θl, α, θ, θlm, θdeg}, x = zuobiaot[[1]] - zuobiao0[[1]];
       y = zuobiaot[[2]] - zuobiao0[[2]]; l = Norm[{x, y}];
If[l != 0, α = Which[y >= 0, ArcCos[x / l], y < 0, π + ArcCos[-(x / l)]], α = 0];
θ = If[S == 0, 0, (1 / 2) ArcTan[(l) / (k S)]]; θdeg = θ 180 / π × 60;
θl = If[θM == 0, 0, θdeg / θM]; θlm = If[θM == 0, 0, θm / θM];
biaopan[0.75 θl, α, 0.75 θlm, If[θl <= θlm, RGBColor[0, 0.5, 0], Red], size]];
processCh[zuobiao0_, zuobiaot_, k_, S_, θm_, θM_, n_: 50, size_: 450] :=
Module[{l, θ, θdeg }, l = Norm[{zuobiaot - zuobiao0}];
       θ = If[S == 0, 0, (1 / 2) ArcTan[(l) / (k S)]];
θdeg = θ 180 / π × 60; If[Length[u] < n, u = Append[u, θdeg],
        u = Drop[u, 1]; u = Append[u, θdeg]];
If[θdeg > θm, EmitSound[sound]];
```

```
        Show[ListLinePlot[u, PlotRange -> {{0, n}, {0, θM}}, AxesLabel -> {Null, "分"},
          AspectRatio -> 0.5, ColorFunction -> Function[{x, y}, If[y > 0.6, Red, Green]]
, Background -> White, ImageSize -> size],
Graphics[{{Text[Style[DateString[], {Blue, 15}], Scaled[{0.5, 0.9}]]},
            {Red, Dashed, Line[{{0, θm}, {n, θm}}]}}], Frame -> True,
          FrameStyle -> RGBColor[0, 0, 0.5]]];
processGr[zuobiao0_, zuobiaot_, k_, S_] := Module[{x, y, α, l, θ, θdeg, tα },
x = zuobiaot[[1]] - zuobiao0[[1]]; y = zuobiaot[[2]] - zuobiao0[[2]]; l = Norm[{x, y}];
If[l != 0, α = Which[y >= 0, ArcCos[x / l], y < 0, π + ArcCos[-(x / l)]], α = 0];
tα = N[(2 π - α + π / 2) * 180 / π]; θ = (1 / 2) ArcTan[(l) / (k S)]; θdeg = N[θ (180 / π) 60];
Grid[{{"当前倾斜角大小: ", Row[{NumberForm[θdeg, {5, 2}], "分"}]},
{"当前倾斜方向: ", Row[{NumberForm[
If[90 < tα <= 360, tα, tα - 360], {4, 1}], "度"}]}}]];
processSave[zuobiao0_, zuobiaot_,
        stmp_, tmpflag_, startorpause_, stopflag_, k_, S_, θm_, θM_] :=
Module[{x, y, α, l, θ, θdeg, tα}, x = zuobiaot[[1]] - zuobiao0[[1]];
        y = zuobiaot[[2]] - zuobiao0[[2]];
l = Norm[{x, y}]; If[l != 0, α = Which[y >= 0, ArcCos[x / l], y < 0, π + ArcCos[-(x / l)]],
          α = 0];
tα = N[(2 π - α + π / 2) * 180 / π]; θ = (1 / 2) ArcTan[(l) / (k S)]; θdeg = N[θ (180 / π) 60];
If[tmpflag, If[! stopflag, If[startorpause, WriteString[stmp, ",", "{",
ToString[NumberForm[AbsoluteTime[] - timestartin, {10, 1}]], ","
ToString[NumberForm[θdeg, {6, 2}]],
            "," ToString[NumberForm[If[90 < tα <= 360, tα, tα - 360], {4, 1}]], "}"];
StringForm["正在记录...\n `1`", n++], Style["已暂停", {Red, 12}]]],
          Style["就绪", {Red, 12}]]];
```

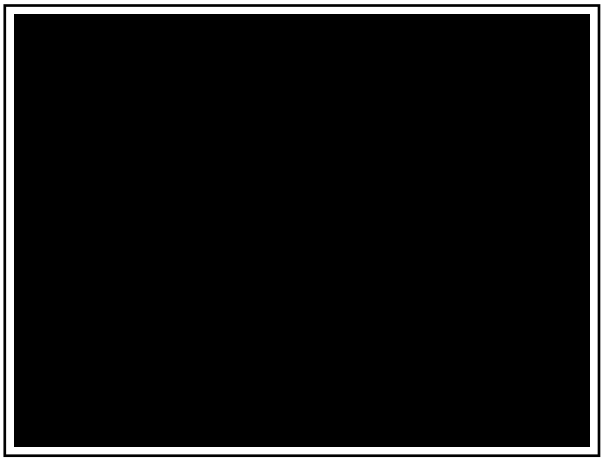
panmian =  ;

```
      biaopan[l_, α_, lm_: 0.5, col_: Green, size_: 400] := Show[panmian,
Graphics[{{Red, Dashed, Circle[{120, 120}, 120 lm]},
           {col, Thickness[0.007], Arrowheads[0.04],
            Arrow[{{120, 120}, {120 l Cos[α] + 120, 120 l Sin[α] + 120}}]}},
          ImageSize -> size], ImageSize → size]

, SaveDefinitions -> True], Background -> RGBColor[236 / 255, 233 / 255, 216 / 255] ]
```

Out[1]=

垂直摆倾斜仪数据采集与分析系统



（0，0）

检查ＣＣＤ　　调整仪器

获取初始照片　　开始监控

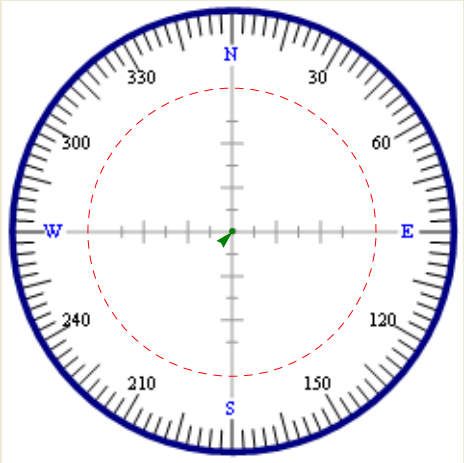
k　４３．

S　１３０

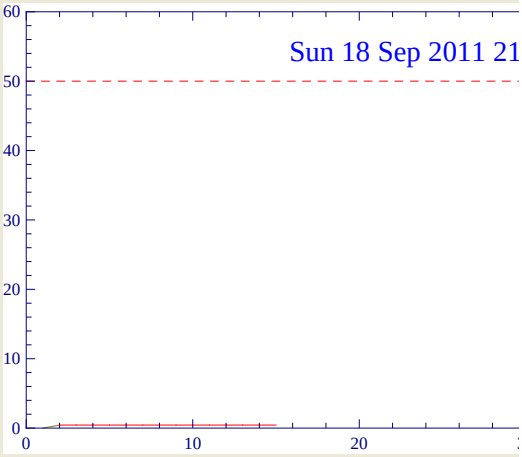
θm　５０

θM　６０

实时倾斜方向监控表盘



实时倾斜角监控曲



当前倾斜角大小：　０．分３

当前倾斜方向：　４５度０

开始　　数据储存设置

停止　　数据处理分析