Outer Billiard Report

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Abstract

This report gives a briefly look about our code and progress in the "Outer Billiard" project.

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This report gives a briefly look about our code and progress in the "Outer Billiard" project.

2 Background theory

2.1 About symmetrical point

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We tried to

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6.1 Function

kcmss

```
(*
Create a point of reflection over a middle point
Usage: reflectPoint[{outPoint},{middlePoint}]
*)
reflectPoint[outPoint_?ListQ, middlePoint_?ListQ]:=(
xMove = -(outPoint[[1]] - middlePoint[[1]]);
yMove = -(outPoint[[2]] - middlePoint[[2]]);
{middlePoint[[1]]+xMove, middlePoint[[2]]+yMove}
)
```

6.2 Main program

kcmss

```
(*--------------------*)
Manipulate[
(*Create the first equilateral triangle*)
triangle1=Polygon[CirclePoints[3]];
xA=0;yA=1; pointA={xA,yA}; textA= Text["A",{0.1,1}];
xB=-(Sqrt[3]/2);yB=-(1/2); pointB={xB,yB}; textB =
    ↪ Text ["B",{-0.92,-0.54}];
xC=Sqrt[3]/2; yC=-(1/2); pointC={xC,yC}; textC = Text[
    ↪ "C",{0.92,-0.54}];

(*Creating a point K randomly*)
(*
xK=RandomReal[{-4,4}];yK=RandomReal[{-4,4}];

While[(xB<xK<xC)||(yB<yK<yA),
xK=RandomReal[{-4,4}];yK=RandomReal[{-4,4}];
]
*)
xK;yK; pointK={xK,yK}; textK=Text["K",{xK+0.1,yK
    ↪ +0.1}];
pointList={pointK};

(*Add everything to the plot2 initially*)
plot2={EdgeForm[Directive[Thick,Blue]],Directive[White
    ↪ ],triangle1,Directive[Black],Point[pointA],Point
```

```
    ↪ [pointB], Point[pointC], textA, textB, textC,
    ↪ PointSize[0.02], Point[pointK], textK};
(*Done creating a equilateral triangle*)

(*Add point to list*)
doCtimes; doCtimes=Floor[doCtimes];
Do[
If[Mod[Length[pointList],3]==1,
pointList=AppendTo[pointList, reflectPoint[Last[
    ↪ pointList], pointA]];,
If [Mod[Length[pointList],3]==2,
pointList=AppendTo[pointList, reflectPoint[Last[
    ↪ pointList], pointB]];,
pointList=AppendTo[pointList, reflectPoint[Last[
    ↪ pointList], pointC]];
]
]
, doCtimes];
plot3={Blue, Point[pointList], Black, Line[pointList]};
plot4={plot2, plot3};

(*Export the result*)
Show[Graphics[plot4], Axes-> True, AxesStyle->Black]
(*————————————————*)

,{{xK,2,"x-coordinate"},-5,5},{{yK,2,"y-coordinate"
    ↪ },-5,5},{{doCtimes,3,"Number of movements"
    ↪ },0,10}
```