

Pensieve header: Computing  $\Theta$  on random rotational virtual knots.

```
In[1]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\Theta"];
Once[<< Theta.m]
```

Loading KnotTheory` version of October 29, 2024, 10:29:52.1301.

Read more at <http://katlas.org/wiki/KnotTheory>.

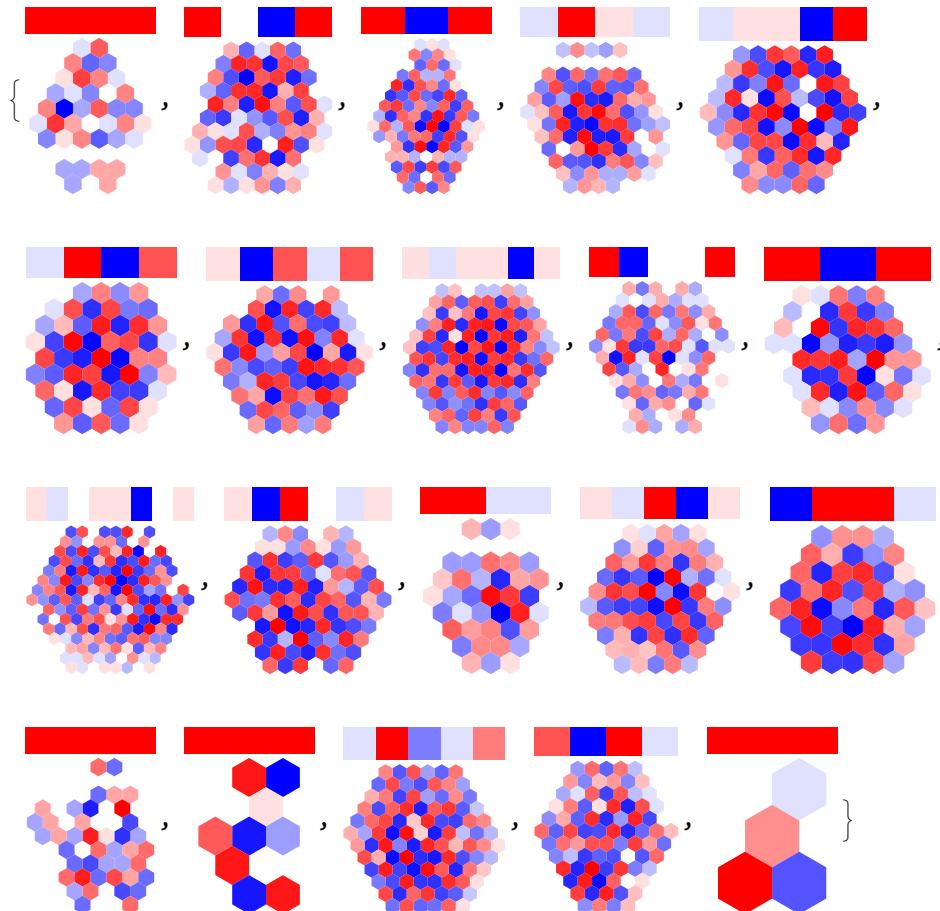
```
In[2]:= RandomVK[n_]:= {Prepend[#, 2 RandomInteger[1]-1]& /@
 Partition[PermutationList[RandomPermutation[2 n], 2 n], 2],
 Table[RandomInteger[{-2, 2}], 2 n+1]};
```

```
In[3]:= RandomVK[3]
```

```
Out[3]= {{{-1, 4, 5}, {-1, 1, 3}, {1, 2, 6}}, {-2, 1, 1, 2, 1, 2, -1}}
```

```
In[4]:= (PolyPlot[\Theta[#], ImageSize \rightarrow Tiny]) & /@ Table[RandomVK[10], 20]
```

```
Out[4]=
```

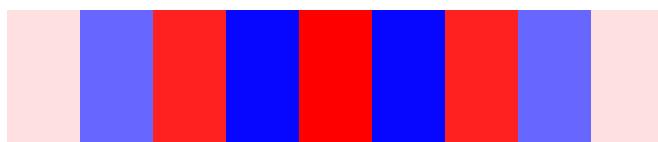


```
In[5]:= Rev[{X_, \phi_}]:= Module[{n=Length@X},
 {Replace[{s_, i_, j_}\mapsto {s, 2 n+1-i, 2 n+1-j}] /@ X, Reverse[PadRight[-\phi, 2 n+1]]}]
```

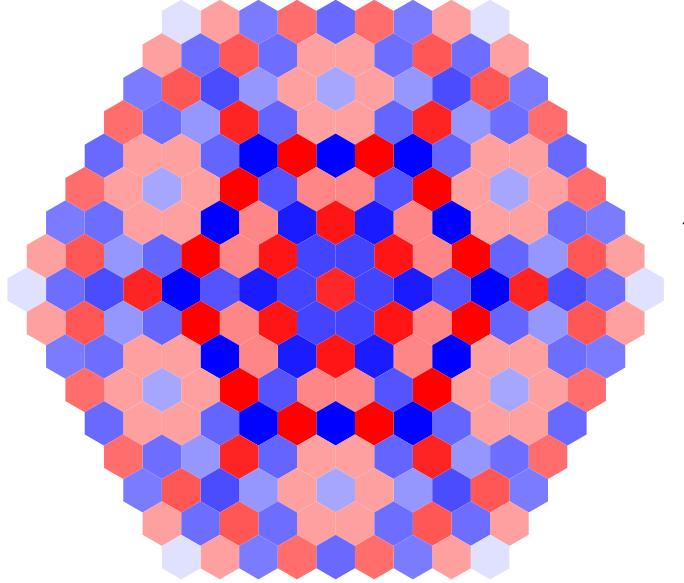
```
In[]:= K = Rot@Knot[10, 100]
Rev@K
{PolyPlot@θ@K, PolyPlot@θ@Rev@K}

Out[]=
{{{{1, 1, 6}, {1, 5, 18}, {-1, 13, 20}, {-1, 7, 14}, {-1, 3, 10},
{-1, 9, 16}, {-1, 11, 4}, {-1, 15, 8}, {-1, 19, 12}, {1, 17, 2}}, {0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0}},

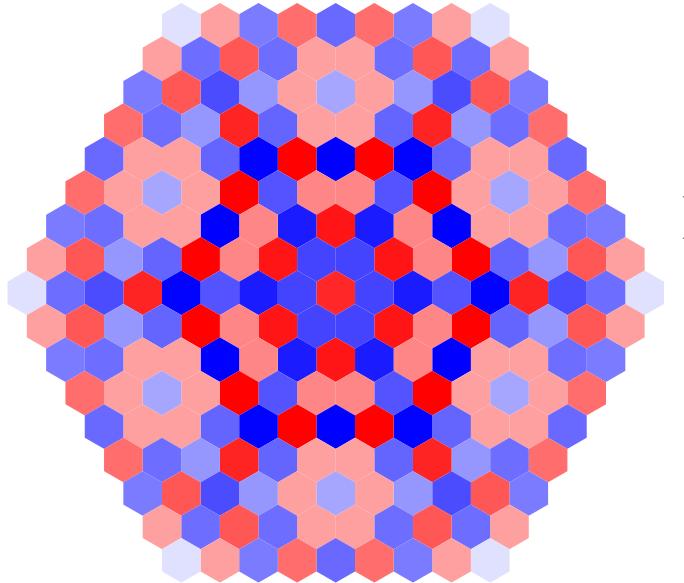
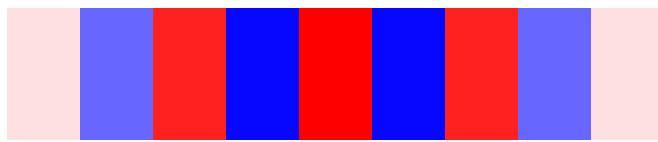
Out[]=
{{{{1, 20, 15}, {1, 16, 3}, {-1, 8, 1}, {-1, 14, 7}, {-1, 18, 11},
{-1, 12, 5}, {-1, 10, 17}, {-1, 6, 13}, {-1, 2, 9}, {1, 4, 19}}, {0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0}}}
```

Out[*n*] =

{



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}

```
In[=]:= Union@Table[θ@Rot@K == θ@Rev@Rot@K, {K, AllKnots[{3, 10}]}]
Out[=]= {True}

In[=]:= K = RandomVK[10]
Rev@K
{PolyPlot@θ@K, PolyPlot@θ@Rev@K}
Out[=]= {{{-1, 7, 20}, {1, 8, 17}, {-1, 3, 5}, {1, 11, 18}, {1, 9, 10},
{-1, 4, 14}, {-1, 13, 15}, {-1, 1, 6}, {-1, 16, 2}, {1, 19, 12}},
{-2, -2, -2, 0, 2, -2, -1, 1, -2, 2, 1, 0, 0, 1, -1, 1, 0, 2, -2, 0}}
Out[=]= {{{{-1, 14, 1}, {1, 13, 4}, {-1, 18, 16}, {1, 10, 3},
{1, 12, 11}, {-1, 17, 7}, {-1, 8, 6}, {-1, 20, 15}, {-1, 5, 19}, {1, 2, 9}},
{0, 2, -2, 0, -1, 1, -1, 0, 0, -1, -2, 2, -1, 1, 2, 2, -2, 0, 2, 2, 2}}}
Out[=]=



,


```

