

Pensieve header: Knot Signatures as in KnotTheory` and as in Kashaev. Continues Kashaev.nb at pensieve://People/Abbasi/.

tex

```
\begin{multicols}{2}
```

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(Alt) In[ ]:=

```
<< KnotTheory`
```

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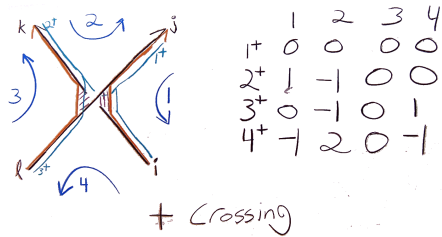
Loading KnotTheory` version of February 2, 2020, 10:53:45.2097.  
Read more at <http://katlas.org/wiki/KnotTheory>.

pdf

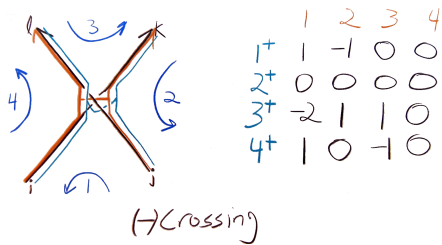
(Alt) In[ ]:=

```
MatrixSignature[A_] := Total[Sign[Select[Eigenvalues[A], Abs[#] > 10^-12 &]]];
Writhe[K_] := Sum[If[PositiveQ[x], 1, -1], {x, List@@PD@K}];
```

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\end{multicols}
\vskip -3mm \hrule \vskip -7mm
\begin{multicols}{2}
```

exec

```
nb2tex$PDFWidth = 1.25 N[284/72];
```

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```
\def\nbpdfInput#1{\vskip 1mm\par\noindent\includegraphics[width=\linewidth]{#1}}
```

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## The Bedlewo program

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```

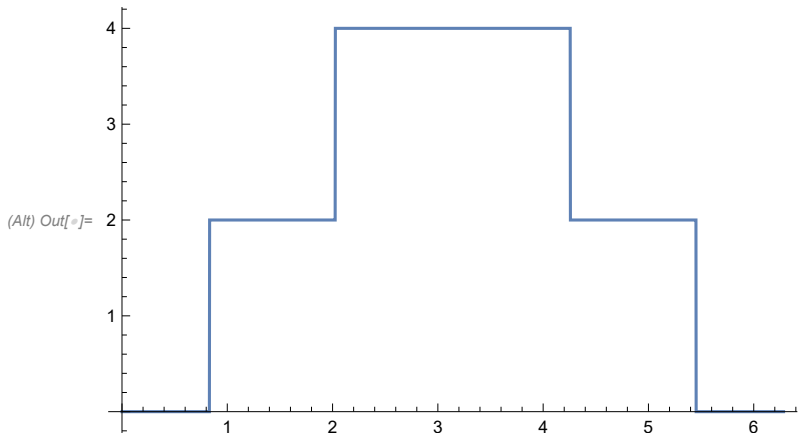
Bed[K_, λ_] := Module[{t, r, armpits, soup, faces, a, A, is},
  t = 1 - λ^2; r = t + t*;
  armpits = Times @@ PD[K] /.
    x : X[i_, j_, k_, L_] => If[PositiveQ[x], X, [j, k, -L, -i], X, [-j, k, L, -i]];
  soup = armpits /. _[X][i_, j_, k_, L_] => a[i, -L] a[j, -i] a[k, -j] a[L, -k];
  faces = soup /. a[i_, x___, j_] a[j_, y___, k_] => a[i, x, j, y, k];
  A = Table[0, Length@faces, Length@faces];
  Do[is = Position[faces, #][[1, 1]] & /@ List @@ x;
    A[[is, is]] += If[Head[x] === X,
      
$$\begin{pmatrix} 0 & t^* & 0 & -t^* \\ t & -r & -t^* & 2t^* \\ 0 & -t & 0 & t \\ -t & 2t & t^* & -r \end{pmatrix}, \begin{pmatrix} r & -t & -2t^* & t^* \\ -t^* & 0 & t^* & 0 \\ -2t & t & r & -t^* \\ t & 0 & -t & 0 \end{pmatrix}],
    {x, List @@ armpits}];
  MatrixSignature[A];$$

```

```

(Alt) In[ ] := Plot[Bed[K = Knot[8, 2], e^{i t/2}], {t, 0, 2 π}]
PositiveQ /@ (List @@ PD[K])

```

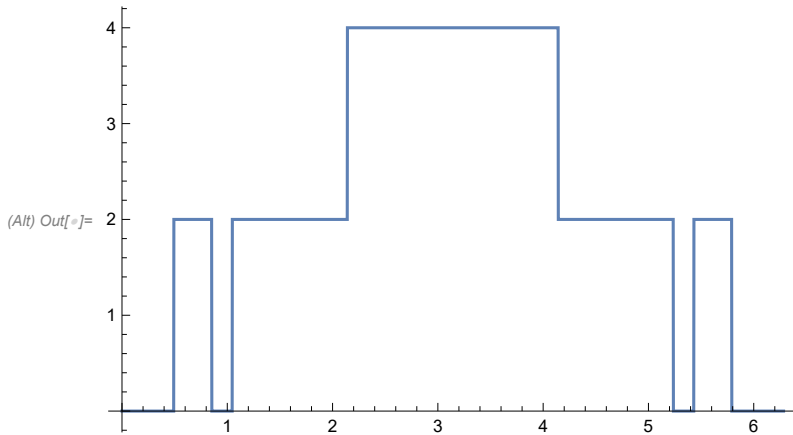


```

(Alt) Out[ ] := {False, False, True, True, False, False, False, False}

```

```
(Alt) In[ ]:= Plot[Bed[Knot@"K12a422", e^{i t/2}], {t, 0, 2 π}]
```



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\columnbreak
```

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## The Kashaev Program

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```
Kas[K_, λ_] := Module[{u, v, armpits, faces, a, A, is},
  u = (λ + λ*) / 2; v = (λ^2 + (λ*)^2) / 2;
  armpits = Times @@ PD[K] /.
    x : X[i_, j_, k_, L_] => If[PositiveQ[x], X_ [j, k, -L, -i], X_ [-j, k, L, -i]];
  soup = armpits /. _[X][i_, j_, k_, L_] => a[i, -L] a[j, -i] a[k, -j] a[L, -k];
  faces = soup /. a[i_, x___, j_] a[j_, y___, k_] => a[i, x, j, y, k];
  A = Table[0, Length@faces, Length@faces];
  Do[is = Position[faces, #] [[1, 1]] & /@ List @@ x;
    A[[is, is]] += If[Head[x] === X_,
      
$$\begin{pmatrix} 1 & u & 1 & u \\ u & v & u & 1 \\ 1 & u & 1 & u \\ u & 1 & u & v \end{pmatrix}, - \begin{pmatrix} v & u & 1 & u \\ u & 1 & u & 1 \\ 1 & u & v & u \\ u & 1 & u & 1 \end{pmatrix}],
    {x, List @@ armpits}];
  (MatrixSignature[A] - Writhe[K]) / 2.];$$

```

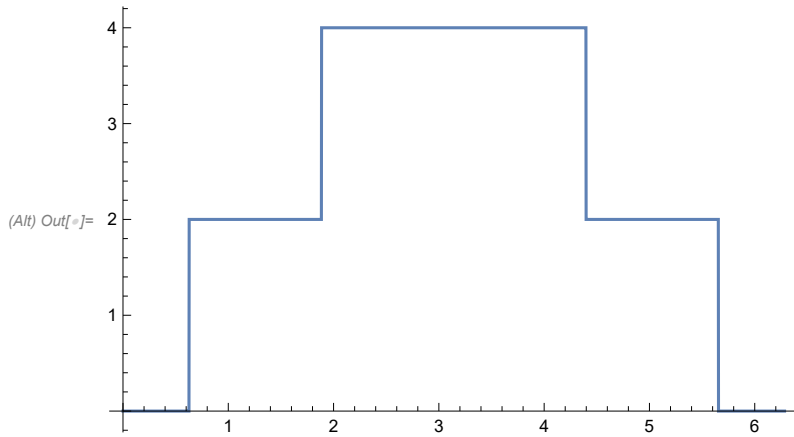
exec

```
nb2tex$PDFWidth = 1.1 N[284/72];
```

tex

```
\def\nbpdfInput#1{\vskip 1mm\par\noindent\includegraphics{#1}}
```

(Alt) In[ ]:= `Plot[Kas[Knot[5, 1], ei t/2], {t, 0, 2 π}]`



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\end{multicols}
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\begin{multicols}{2}
```

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## Comparison

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(Alt) In[ ]:= `Sum[λ = ei RandomReal[{0, π}]; Bed[K, λ] == Kas[K, λ], {10}, {K, AllKnots[{3, 10]}]}`

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(Alt) Out[ ]:= 2490 True

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```
\end{multicols}
```