In[•]:=
```
<< KnotTheory`
```

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

In[•]:=
```
FactorList[HOMFLYPT[Knot[9, 12]][a, z]]
```

Out[•]=
$$\left\{\{-1, 1\}, \left\{1 - a^2 + a^4 - a^2 z^2, 1\right\}, \left\{-1 - a^2 + a^4 - z^2 - a^2 z^2, 1\right\}\right\}$$

In[•]:=
```
Cases[AllKnots[{3, 10}],
 K_ /; Length[
    Cases[
     FactorList[HOMFLYPT[K][a, z]],
     {f_Plus, p_}
    ]
   ] > 1
]
```

Out[•]=
```
{Knot[9, 12]}
```

In[•]:=
```
Factor[HOMFLYPT[Knot[9, 12]][a, z]]
```

Out[•]=
$$-\left(\left(1 - a^2 + a^4 - a^2 z^2\right)\left(-1 - a^2 + a^4 - z^2 - a^2 z^2\right)\right)$$

In[•]:=
```
Cases[AllKnots[{3, 12}],
 K_ /; Length[
    Cases[
     FactorList[HOMFLYPT[K][a, z]],
     {f_Plus, p_}
    ]
   ] > 1
]
```

KnotTheory: Loading precomputed data in DTCode4KnotsTo11`.

KnotTheory: The GaussCode to PD conversion was written by Siddarth Sankaran at the University of Toronto in the summer of 2005.

KnotTheory: Loading precomputed data in KnotTheory/12A.dts.

KnotTheory: Loading precomputed data in KnotTheory/12N.dts.

General: Further output of KnotTheory::loading will be suppressed during this calculation.

Out[•]=
```
{Knot[9, 12], Knot[11, Alternating, 175], Knot[11, Alternating, 176],
 Knot[11, Alternating, 220], Knot[11, Alternating, 306],
 Knot[12, Alternating, 151], Knot[12, Alternating, 165], Knot[12, Alternating, 259],
 Knot[12, Alternating, 300], Knot[12, Alternating, 471], Knot[12, Alternating, 505],
 Knot[12, Alternating, 506], Knot[12, Alternating, 515], Knot[12, Alternating, 517],
 Knot[12, Alternating, 535], Knot[12, NonAlternating, 500]}
```

In[•]:=
```
Column[
 (# → Factor[HOMFLYPT[#][a, z]]) & /@ {Knot[9, 12], Knot[11, Alternating, 175],
   Knot[11, Alternating, 176], Knot[11, Alternating, 220], Knot[11, Alternating, 306],
   Knot[12, Alternating, 151], Knot[12, Alternating, 165], Knot[12, Alternating, 259],
   Knot[12, Alternating, 300], Knot[12, Alternating, 471], Knot[12, Alternating, 505],
   Knot[12, Alternating, 506], Knot[12, Alternating, 515], Knot[12, Alternating, 517],
   Knot[12, Alternating, 535], Knot[12, NonAlternating, 500]}
]
```

KnotTheory: Loading precomputed data in PD4Knots`.

KnotTheory: The HOMFLYPT program was written by Scott Morrison.

KnotTheory: Loading precomputed data in DTCode4KnotsTo11`.

KnotTheory: The GaussCode to PD conversion was written by Siddarth Sankaran at the University of Toronto in the summer of 2005.

KnotTheory: Loading precomputed data in KnotTheory/12A.dts.

General: Further output of KnotTheory::loading will be suppressed during this calculation.

Out[•]=

$$\text{Knot}[9, 12] \to -\left(\left(1 - a^2 + a^4 - a^2 z^2\right)\left(-1 - a^2 + a^4 - z^2 - a^2 z^2\right)\right)$$

$$\text{Knot}[11, \text{Alternating}, 175] \to -\frac{\left(-1+2a^2+a^2z^2\right)\left(-2a^2+a^4+2z^2-5a^2z^2+2a^4z^2+z^4-4a^2z^4+a^4z^4-a^2z^6\right)}{a^4}$$

$$\text{Knot}[11, \text{Alternating}, 176] \to \frac{\left(-1+2a^2+a^2z^2\right)\left(1-a^2+a^4+2z^2-5a^2z^2+2a^4z^2+z^4-4a^2z^4+a^4z^4-a^2z^6\right)}{a^6}$$

$$\text{Knot}[11, \text{Alternating}, 220] \to \frac{\left(1-a^2+a^4-a^2z^2\right)\left(-1+2a^4-z^2+2a^2z^2+3a^4z^2+a^2z^4+a^4z^4\right)}{a^{10}}$$

$$\text{Knot}[11, \text{Alternating}, 306] \to a^2\left(-2+a^2-z^2\right)\left(-2a^2+a^4+2z^2-5a^2z^2+2a^4z^2+z^4-4a^2z^4+a^4z^4-a^2z^6\right)$$

$$\text{Knot}[12, \text{Alternating}, 151] \to -\frac{\left(-1+a^2+a^4+a^2z^2+a^4z^2\right)\left(-1+2a^2-2a^4+2a^2z^2-2a^4z^2+a^6z^2-a^4z^4\right)}{a^{10}}$$

$$\text{Knot}[12, \text{Alternating}, 165] \to \frac{\left(-1+a^2+a^4+a^2z^2+a^4z^2\right)\left(-1+3a^2-2a^4+a^6+2a^2z^2-3a^4z^2+a^6z^2-a^4z^4\right)}{a^{10}}$$

$$\text{Knot}[12, \text{Alternating}, 259] \to \frac{\left(1-a^2+a^4-a^2z^2\right)\left(1-a^2+a^6+z^2-2a^2z^2-2a^4z^2+a^6z^2-a^2z^4-a^4z^4\right)}{a^6}$$

$$\text{Knot}[12, \text{Alternating}, 300] \to \frac{\left(1-a^2+a^4-a^2z^2\right)\left(a^6+z^2-a^2z^2-a^4z^2+a^6z^2-a^2z^4-a^4z^4\right)}{a^8}$$

$$\text{Knot}[12, \text{Alternating}, 471] \to \frac{\left(1-a^2+a^4-a^2z^2\right)\left(1-a^4+a^8-a^2z^2-2a^4z^2-a^6z^2\right)}{a^6}$$

$$\text{Knot}[12, \text{Alternating}, 505] \to \left(-2+a^2-z^2\right)\left(-2a^4+a^6-z^2+3a^2z^2-4a^4z^2+a^6z^2-z^4+3a^2z^4-2a^4z^4+a^2z^6\right)$$

$$\text{Knot}[12, \text{Alternating}, 506] \to \frac{\left(1-a^2+a^4-a^2z^2\right)\left(1-a^2+a^4+2z^2-5a^2z^2+2a^4z^2+z^4-4a^2z^4+a^4z^4-a^2z^6\right)}{a^4}$$

$$\text{Knot}[12, \text{Alternating}, 515] \to -\frac{\left(-1+2a^2+a^2z^2\right)\left(-1+a^2-a^4-z^2+4a^2z^2-3a^4z^2+a^6z^2+2a^2z^4-3a^4z^4+a^6z^4-a^4z^6\right)}{a^6}$$

$$\text{Knot}[12, \text{Alternating}, 517] \to \frac{\left(1-a^2+a^4-a^2z^2\right)\left(-a^2+2a^4+2z^2-4a^2z^2+3a^4z^2+z^4-4a^2z^4+a^4z^4-a^2z^6\right)}{a^8}$$

$$\text{Knot}[12, \text{Alternating}, 535] \to -\frac{\left(1-a^2+a^4-a^2z^2\right)\left(-2a^2+a^4+2z^2-5a^2z^2+2a^4z^2+z^4-4a^2z^4+a^4z^4-a^2z^6\right)}{a^2}$$

$$\text{Knot}[12, \text{NonAlternating}, 500] \to -\left(\left(-1 + 2a^2 + a^2z^2\right)\left(-2 + a^4 - 3z^2 - 2a^2z^2 + a^4z^2 - z^4 - a^2z^4\right)\right)$$