Pensieve header: Comparing frakg_1 with Roland's picture.

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\OneCo-1606"];
<< OneCo.m;
ϵ = 0;
```

```
bas = LBasis[1] /. x_ ↦ x
```

```
{U[], U[c], U[u], U[w], U[u, w]}
```

```
u1 = f3 U[c] + ϵ f6 U[c] + f4 U[u] + ϵ f7 U[u] + f5 U[w] + ϵ f8 U[w] +
    ϵ f10 U[c, c] + ϵ f11 U[c, u] + ϵ f12 U[c, w] + f9 U[u, w] + ϵ f13 U[u, w];
w1 = g3 U[c] + ϵ g6 U[c] + g4 U[u] + ϵ g7 U[u] + g5 U[w] + ϵ g8 U[w] +
    ϵ g10 U[c, c] + ϵ g11 U[c, u] + ϵ g12 U[c, w] + g9 U[u, w] + ϵ g13 U[u, w];
c1 = h1 U[] + ϵ h2 U[] + h3 U[c] + ϵ h6 U[c] + h4 U[u] + ϵ h7 U[u] + h5 U[w] + ϵ h8 U[w] +
    ϵ h10 U[c, c] + ϵ h11 U[c, u] + ϵ h12 U[c, w] + h9 U[u, w] + ϵ h13 U[u, w];
eqs1 = Simp[{
    B[w1, c1] - w1,
    B[c1, u1] - u1,
    B[w1, u1] - (ϵ u1 ** w1 + (1 - t - 0 ϵ t) U[] - 2 ϵ t c1)
   }]
```

```
{(-b g5 h4 + b g4 h5) U[] - g3 U[c] + (-g4 - g4 h3 + g3 h4 - b g9 h4 + b g4 h9) U[u] +
   (-g5 + g5 h3 - g3 h5 + b g9 h5 - b g5 h9) U[w] - g9 U[u, w],
  (b f5 h4 - b f4 h5) U[] - f3 U[c] + (-f4 + f4 h3 - f3 h4 + b f9 h4 - b f4 h9) U[u] +
   (-f5 - f5 h3 + f3 h5 - b f9 h5 + b f5 h9) U[w] - f9 U[u, w], (-1 + t + b f5 g4 - b f4 g5) U[] +
   (f4 g3 - f3 g4 + b f9 g4 - b f4 g9) U[u] + (-f5 g3 + f3 g5 - b f9 g5 + b f5 g9) U[w]}
```

```
eqs2 = DeleteCases[Cases[eqs1, a_ * _U ↦ {(a /. ϵ → 0) == 0}, ∞] // Flatten, True]
```

```
{-b g5 h4 + b g4 h5 == 0, -g3 == 0, -g4 - g4 h3 + g3 h4 - b g9 h4 + b g4 h9 == 0,
 -g5 + g5 h3 - g3 h5 + b g9 h5 - b g5 h9 == 0, -g9 == 0,
 b f5 h4 - b f4 h5 == 0, -f3 == 0, -f4 + f4 h3 - f3 h4 + b f9 h4 - b f4 h9 == 0,
 -f5 - f5 h3 + f3 h5 - b f9 h5 + b f5 h9 == 0, -f9 == 0, -1 + t + b f5 g4 - b f4 g5 == 0,
 f4 g3 - f3 g4 + b f9 g4 - b f4 g9 == 0, -f5 g3 + f3 g5 - b f9 g5 + b f5 g9 == 0}
```

```
vars = Union@Cases[eqs2, f_ | g_ | h_, ∞]
```

```
{f3, f4, f5, f9, g3, g4, g5, g9, h3, h4, h5, h9}
```

```
sol = Solve[eqs2, vars]
```

Solve::svars : Equations may not give solutions for all "solve" variables. >>

$$\left\{\left\{f_3 \to 0,\ f_4 \to 0,\ f_9 \to 0,\ g_3 \to 0,\ g_4 \to \frac{1-t}{b\ f_5},\ g_5 \to 0,\ g_9 \to 0,\ h_3 \to -1+b\ h_9,\ h_4 \to 0,\ h_5 \to 0\right\},\right.$$
$$\left.\left\{f_3 \to 0,\ f_5 \to 0,\ f_9 \to 0,\ g_3 \to 0,\ g_4 \to 0,\ g_5 \to \frac{-1+t}{b\ f_4},\ g_9 \to 0,\ h_3 \to 1+b\ h_9,\ h_4 \to 0,\ h_5 \to 0\right\}\right\}$$

```
further = {f4 → (-1 + t)/b, h9 -> -((-2 + b + 2 t + b t)/(4 b^2 t))}
```

$$\left\{f_4 \to \frac{-1+t}{b},\ h_9 \to -\frac{-2+b+2\,t+b\,t}{4\,b^2\,t}\right\}$$

```
u1 /. sol[[2]] /. further
```

$$\frac{(-1+t)\,U[u]}{b}$$

```
Collect[w1 /. sol[[2]] /. further, _U, Simplify]
```

```
U[w]
```

```
Collect[c1 /. sol[[2]] /. further, _U, Simplify]
```

$$h_1\,U[\,] + \left(1 - \frac{-2+b+2\,t+b\,t}{4\,b\,t}\right) U[c] - \frac{(-2+b+2\,t+b\,t)\,U[u, w]}{4\,b^2\,t}$$

```
Simp[eqs1 /. sol[[2]] /. further] // Simplify
```

```
{0, 0, 0}
```

```
Collect[{c1, u1, w1} /. sol[[2]] /. further /. ϵ → 0, _U, Simplify]
```

$$\left\{h_1\,U[\,] + \left(1 - \frac{-2+b+2\,t+b\,t}{4\,b\,t}\right) U[c] - \frac{(-2+b+2\,t+b\,t)\,U[u, w]}{4\,b^2\,t},\ \frac{(-1+t)\,U[u]}{b},\ U[w]\right\}$$

```
Collect[{c1, u1, w1} /. sol[[2]] /. {f4 → (-1 + t)/b, h1|9 → 0} /. ϵ → 0, _U, Simplify]
```

$$\left\{U[c],\ \frac{(-1+t)\,U[u]}{b},\ U[w]\right\}$$