

Pensieve header: A first attempt to get $\$V\$$ from $\$\Phi\$$.

```

SetDirectory["C:\\drorbn\\AcademicPensieve\\2012-05\\beta5.1"];
<< betaCalculus.m
Clear[ħ]; Unprotect[C];
$PerturbativeDegree = 8;
βSimplify[expr_] := Replace[
  Series[Normal[expr], {ħ, 0, $PerturbativeDegree}],
  sd_SeriesData => MapAt[Expand, sd, 3]
];
βCollect[B[ω_, μ_] := B[βSimplify[ω], βSimplify[μ]];
{V, C, sol} = Get[Switch[$PerturbativeDegree,
  4, "SolutionToDegree4-120523.m",
  6, "SolutionToDegree6-120523.m",
  8, "SolutionToDegree8-120524.m"
]];
C = C /. κ1 → 0;
Φ = (Inverse[V] // dP[12, 3]) ** Inverse[V] ** (V // dP[2, 3]) ** (V // dP[1, 23]);
v = B[Series[ $\frac{\text{Sinh}[c_1 \hbar / 2]}{c_1 \hbar / 2}$ , {ħ, 0, $PerturbativeDegree}], 0];
buckle = (Inverse[Φ] // dP[13, 2, 4]) **
  (Φ // dP[1, 3, 2]) ** θ[3, 2] ** Inverse[Φ] ** (Φ // dP[12, 3, 4])

```

A very large output was generated. Here is a sample of it:

(<<1>>)

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```
LuckyV = buckle // tη[1] // hη[2] // dm[1, 2, 1] // tη[3] // hη[4] // dm[3, 4, 2]
```

$$\begin{pmatrix} 1 & h[1] \\ t[1] & \frac{c_2 \hbar}{24} + \left(-\frac{7 c_1^2 c_2}{5760} - \frac{7 c_1 c_2^2}{5760} - \frac{c_2^3}{1440} \right) \hbar^3 + \left(\frac{31 c_1^4 c_2}{967680} + \frac{31 c_1^3 c_2^2}{483840} + \frac{83 c_1^2 c_2^3}{967680} + \frac{13 c_1 c_2^4}{241920} + \frac{c_2^5}{60480} \right) \hbar^5 + \left(-\frac{127 c_1^6 c_2}{154828800} - \frac{1}{51} \right) \hbar^7 \\ t[2] & -\frac{c_1 \hbar}{24} + \left(\frac{7 c_1^3}{5760} + \frac{7 c_1^2 c_2}{5760} + \frac{c_1 c_2^2}{1440} \right) \hbar^3 + \left(-\frac{31 c_1^5}{967680} - \frac{31 c_1^4 c_2}{483840} - \frac{83 c_1^3 c_2^2}{967680} - \frac{13 c_1^2 c_2^3}{241920} - \frac{c_1 c_2^4}{60480} \right) \hbar^5 + \left(\frac{127 c_1^7}{154828800} + \frac{12}{51} \right) \hbar^7 \end{pmatrix}$$

V

$$\left(1 - \frac{1}{48} (C_1 C_2) \hbar^2 + \left(\frac{c_1^3 c_2}{2880} + \frac{17 c_1^2 c_2^2}{23040} + \frac{c_1 c_2^3}{2880} \right) \hbar^4 + \left(-\frac{c_1^5 c_2}{120960} - \frac{c_1^4 c_2^2}{35840} - \frac{103 c_1^3 c_2^3}{2580480} - \frac{c_1^2 c_2^4}{35840} - \frac{c_1 c_2^5}{120960} \right) \hbar^6 + \left(\frac{c_1^7 c_2}{4838400} + \right. \right. \\ \left. \left. t[1] \right. \right. \\ \left. \left. t[2] \right. \right.$$

```
Simplify[LuckyV (C // dP[12]) Inverse[C] (Inverse[C] // dP[2]) == V]
```

True