Es<-->El Algebraically

December-17-14 10:36 AM

From CheatSheetFreeLie:

5. ✓ Γ: With $\Gamma(t) \in FL(T)^T$ solving $\Gamma(0) = 0$, $\Gamma'(s) = \lambda /\!\!/ e^{-\partial_{s\lambda}} /\!\!/ \frac{\operatorname{ad}\Gamma(s)}{e^{\operatorname{ad}\Gamma(s)}-1}$, $e^{-\partial_\lambda} = C^{\Gamma(1)}$

6. ✓ Λ: With $\Lambda(t) \in FL(T)^T$ solving $\Lambda(0) = 0$, $\Lambda'(s) = \lambda /\!\!/ e^{\partial_{\Lambda(s)}} /\!\!/ \frac{\operatorname{ad}_{tb}\Lambda(s)}{e^{\operatorname{ad}_{tb}\Lambda(s)}-1}$, $e^{-\partial_{\Lambda(1)}} = C^\lambda$

From WK04.nb (but will move):

```
λ2 = ⟨1 → RandomLieSeries[{1, 2}], 2 → RandomLieSeries[{1, 2}]⟩
```

$$\left\langle 1 \to \mathrm{LS}\left[\overline{2},\ 0,\ -\frac{1}{3}\,\overline{1\overline{12}} - \overline{\overline{12}2},\ \frac{41}{24}\,\overline{1\overline{1\overline{12}}} + \frac{19}{12}\,\overline{1\overline{\overline{12}2}} + \frac{7}{12}\,\overline{\overline{\overline{12}2}2},\ \ldots\right],\ 2 \to \mathrm{LS}\left[2\,\overline{1} + 2\,\overline{2},\ -2\,\overline{12},\ -\frac{1}{3}\,\overline{1\overline{12}} + \frac{5}{6}\,\overline{\overline{12}2},\ \frac{29}{24}\,\overline{1\overline{1\overline{12}}} - \frac{11}{8}\,\overline{1\overline{\overline{12}2}} - \frac{17}{12}\,\overline{\overline{\overline{12}2}2},\ \ldots\right]\right\rangle$$

```
{lhs = λ2 // EulerE // adSeries[(ⅇ^ad - 1)/ad, λ2] // RC[-λ2],
 rhs = Λ[λ2] // EulerE // adSeries[(ⅇ^ad - 1)/ad, Λ[λ2], tb]; (lhs ≡ rhs) @ {8}}
```

$$\left\{\left\langle 1 \to \mathrm{LS}\left[\overline{2},\ -2\,\overline{12},\ \overline{1\overline{12}} - \overline{\overline{12}2},\ \frac{15}{2}\,\overline{1\overline{1\overline{12}}} + \frac{20}{3}\,\overline{1\overline{\overline{12}2}} - \frac{5}{6}\,\overline{\overline{\overline{12}2}2},\ \ldots\right],\ 2 \to \mathrm{LS}\left[2\,\overline{1} + 2\,\overline{2},\ -6\,\overline{12},\ 5\,\overline{1\overline{12}} + \frac{11}{2}\,\overline{\overline{12}2},\ \frac{3}{2}\,\overline{1\overline{1\overline{12}}} - \frac{45}{2}\,\overline{1\overline{\overline{12}2}} - \frac{49}{6}\,\overline{\overline{\overline{12}2}2},\ \ldots\right]\right\rangle,\ \mathrm{BS}[9\ \mathrm{True},\ \ldots]\right\}$$

RHS at $\Lambda(\lambda_2) \to \lambda_2$, meaning

$$\lambda_2 /\!\!/ E /\!\!/ \frac{e^{\operatorname{ad}_{tb}\lambda_2}-1}{\operatorname{ad}_{tb}\lambda_2}$$

is $Z^{-1}EZ$ (up to signs etc.)