$$
\begin{aligned}
\Psi_{131} &= C_1\left(-|0202\rangle+|2020\rangle\right)\\
&\quad +C_2\left(|02du\rangle-|02ud\rangle+|0du2\rangle-|0ud2\rangle-|20du\rangle+|20ud\rangle-|2du0\rangle+|2ud0\rangle-|d02u\rangle+|d20u\rangle+|du02\rangle-|du20\rangle+|u02d\rangle-|u20d\rangle-|ud02\rangle+|ud20\rangle\right)\\
&\quad +C_3\left(-|0d2u\rangle+|0u2d\rangle-|2d0u\rangle+|2u0d\rangle+|d0u2\rangle+|d2u0\rangle-|u0d2\rangle-|u2d0\rangle\right)
\end{aligned}
$$

$$
C_1 = \frac{-48\,\left(-i+\sqrt{3}\right)\,t^2+\left(-U+\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{1}{3}}\right)\,\left(\left(-i+\sqrt{3}\right)\,U+\left(i+\sqrt{3}\right)\,\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{1}{3}}\right)}{\sqrt{2}\,\left(-48\,\left(-i+\sqrt{3}\right)\,t^2-\left(-i+\sqrt{3}\right)\,U^2+4\,i\,U\,\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{1}{3}}+\left(i+\sqrt{3}\right)\,\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{2}{3}}\right)}
$$

$$
C_2 = \frac{-48\,i\,\left(-i+\sqrt{3}\right)\,t^2+\left(-U+\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{1}{3}}\right)\,\left(U+i\,\sqrt{3}\,U+i\,\left(i+\sqrt{3}\right)\,\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{1}{3}}\right)}{48\,\sqrt{2}\,t\,\left(-36\,t^2\,U+U^3+6\,\sqrt{6}\,\sqrt{-\left(t^2\,\left(512\,t^4+26\,t^2\,U^2+U^4\right)\right)}\right)^{\frac{1}{3}}}
$$

$$
C_3 = \frac{1}{2\,\sqrt{2}}
$$