$$
\begin{aligned}
&\sin^3\theta\cos^2\theta \\
=&\left(\frac{e^{i\theta}-e^{-i\theta}}{2i}\right)^3\left(\frac{e^{i\theta}+e^{-i\theta}}{2}\right)^2 \\
=&-\frac{e^{5ix}}{32i}+\frac{e^{3ix}}{32i}+\frac{e^{ix}}{16i} \\
&+\frac{e^{-5ix}}{32i}-\frac{e^{-3ix}}{32i}-\frac{e^{-ix}}{16i} \\
=&\frac{1}{16}\left(2\sin\theta+\sin 3\theta-\sin 5\theta\right).
\end{aligned}
$$