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Local Scale-Dependent Non-Gaussian Curvature Perturbations at Cubic Order

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We calculate non-Gaussianities in the bispectrum and trispectrum arising from the cubic term in the local expansion of the scalar curvature perturbation. We compute to three-loop order and for general momenta. A procedure for evaluating the leading behavior of the resulting loop-integrals is developed and discussed. Finally, we survey unique non-linear signals which could arise from the cubic term in the squeezed limit. In particular, it is shown that loop corrections can cause $f_{NL}^{sq.}$ to change sign as the momentum scale is varied. There also exists a momentum limit where $\tau_{NL} <0$ can be realized.

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