

# Exploring one loop amplitude at four-point vertices by the OPP method

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We construct the general formula of one-loop amplitude at four-point vertices using Ossola, Papadopoulos, and Pittau (OPP) method. The incoming and outgoing particles are defined as arbitrary massless particles, and the intermediate state contains arbitrary particles inside. In this work, the amplitude is reconstructed via finding four-type rational coefficients. First, box coefficient is extracted using the four-cut technique with linear algebra. We found that triangle and bubble coefficients can be extracted using three-cut and two-cut technique with Cauchy's residue theorem instead of with discrete Fourier sum like the original version of the OPP. Tadpole coefficient can be dropped out, because its scalar integral, which contains only UV divergence, is completely absorbed by renormalization.

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