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The Two-Higgs Doublet Model beyond tree-level: A gauge-invariant formalism

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Keeping the gauge symmetry manifest in the two-Higgs doublet model (THDM)
has turned out to be very powerful. Stability, electroweak-symmetry breaking, basis transformations, and general symmetries can be studied concisely in terms of gauge-invariant bilinears for any THDM Higgs potential. Recently, the formalism has been extended to the complete model, including the gauge and Yukawa sectors, all in terms of gauge-invariant expressions. Now, we extend the formalism beyond the leading order where we show how bilinears can be used together with the ħ-expansion formalism to derive quantum corrections. We present simple and gauge-invariant results for the one-loop corrections directly applicable to the THDM.

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