Derivatives of local times for some Gaussian fields

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Abstract: In this article, we consider derivatives of local time for a $(2,d)$-Gaussian field [Z=big{ Z(t,s)= X^{H_1}_t -widetilde{X}^{H_2}_s, s,t ge 0big},] where X^{H_1} and $widetilde{X}^{H_2}$ are two independent processes from a class of d-dimensional centered Gaussian processes satisfying certain local nondeterminism property. We first give a condition for existence of derivatives of the local time. Then, under this condition, we show that derivatives of the local time are H"{o}lder continuous in both time and space variables. Moreover, under some additional assumptions, we show that this condition is also necessary for existence of derivatives of the local time at the origin.