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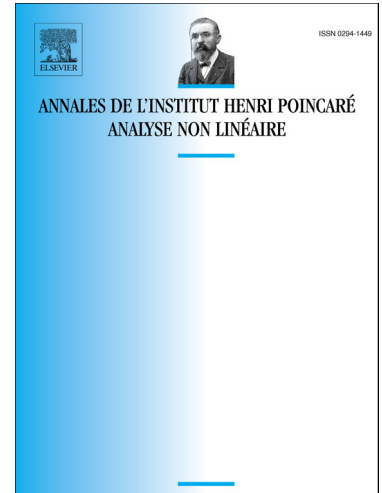
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## DINI ESTIMATES FOR NONLOCAL FULLY NONLINEAR ELLIPTIC EQUATIONS

HONGJIE DONG AND HONG ZHANG

ABSTRACT. We obtain Dini type estimates for a class of concave fully nonlinear nonlocal elliptic equations of order  $\sigma \in (0, 2)$  with rough and non-symmetric kernels. The proof is based on a novel application of Campanato's approach and a refined  $C^{\sigma+\alpha}$  estimate in [9].

### 1. INTRODUCTION AND MAIN RESULTS

The paper is a continuation of our previous work [9], where we studied Schauder estimates for concave fully nonlinear nonlocal elliptic and parabolic equations. In particular, when the kernels are translation invariant and the data are merely bounded and measurable, we proved the  $C^\sigma$  estimate, which is very different from the classical theory for second-order elliptic and parabolic equations. In this paper, we consider concave fully nonlinear nonlocal elliptic equations with Dini continuous coefficients and nonhomogeneous terms, and establish a  $C^\sigma$  estimate under these assumptions.

The study of classical elliptic equations with Dini continuous coefficients and data has a long history. Burch [4] first considered divergence type linear elliptic equations with Dini continuous coefficients and data, and estimated the modulus of continuity of the derivatives of solutions. The corresponding result for concave fully nonlinear elliptic equations was obtained by Kovats [15], which generalized a previous result by Safonov [25]. Wang [29] studied linear non-divergence type elliptic and parabolic equations with Dini continuous coefficients and data, and gave a simple proof to estimate the modulus of continuity of the second-order derivatives of solutions. See, also [19, 28, 1, 12, 20, 18], and the references therein.

Recently, there is extensive work on the regularity theory for nonlocal elliptic and parabolic equations. For example,  $C^\alpha$  estimates,  $C^{1,\alpha}$  estimates, Evans-Krylov type theorem, and Schauder estimates were established in the past decade. See, for instance, [5, 6, 10, 11, 13, 7, 8, 17, 16, 27, 23], and the references therein. In particular, Mou [23] investigated a class of concave fully nonlinear nonlocal elliptic equations with smooth symmetric kernels, and obtained the  $C^\sigma$  estimate under a slightly stronger assumption than the usual Dini continuity on the coefficients and data. The author implemented a recursive Evans-Krylov theorem, which was first studied by Jin and Xiong [17], as well as a perturbation type argument. In this paper, by using a novel perturbation type argument, we relax the regularity assumption to simply Dini continuity and also remove the symmetry and smoothness assumptions on the kernels.

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