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## Article

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### Fractional integrodifferential equations with nonlocal conditions and generalized Hilfer fractional derivative

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## Abstact

We study some basic properties of the qualitative theory such as existence, uniqueness, and stability of solutions to the first-order of weighted Cauchy-type problem for nonlinear fractional integro-differential equation with nonlocal conditions involving a general form of Hilfer fractional derivative. The fractional integral and derivative of different orders are involved in the given problem and the classical integral is involved in nonlinear terms. We establish the equivalence between the weighted Cauchy-type problem and its mixed type integral equation by employing various tools and properties of fractional calculus in weighted spaces of continuous functions. The Krasnoselskii's fixed point theorem and the Banach fixed point theorem are used to obtain the existence and uniqueness of solutions of a given problem, and also the results of nonlinear analysis such as Arzila-Ascoli theorem and some special functions like Gamma function, Beta function, and Mittag-Leffler function serves as tools in our analysis. Further, the generalized Gronwall inequality is used to obtain the Ulam-Hyers, generalized Ulam-Hyers, Ulam-Hyers-Rassias, and generalized Ulam-Hyers-Rassias stability

of solutions of the weighted Cauchy-type problem. In the end, we provide two examples demonstrating our main results.