Chains in CR geometry as geodesics of a Kropina metric

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Abstract: With the help of a generalization of the Fermat principle in general relativity, we show that chains in CR geometry are geodesics of a certain Kropina metric constructed from the CR structure. We study the projective equivalence of Kropina metrics and show that if the kernel distributions of the corresponding 1-forms are non-integrable then two projectively equivalent metrics are trivially projectively equivalent. As an application, we show that sufficiently many chains determine the CR structure up to conjugacy, generalizing and reproving the main result of [J.-H. Cheng, 1988]. The talk is based on a joint paper with J.-H. Cheng, T. Marugame and R. Montgomery.