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Theoretical study of nanoscale four-probe measurements: the effects of resonant scattering by localized states at the probe-sample contacts ASAKO TERASAWA, KEIJI TOBIMATSU, TOMOFUMI TADA, TAKAHIRO YAMAMOTO, SATOSHI WATANABE, Dept. of Materials Engineering, The Univ. of Tokyo — Quantum effects on multi-probe conduction are one of the topics of growing importance in nanoscience and nanotechnology. Interesting features are reported in nanoscale four-probe measurements such as the resistance oscillation and the negative four-probe resistance [1]. We investigated the behavior of nanoscale four-probe resistance theoretically, and found that the oscillation of four-probe resistance of nanowires can be understood in terms of the interference caused by multiple reflections between voltage probes [2]. In the present work, we have further analyzed the relation between the resistance oscillation and interference on the basis of the spectrum of the peak spacing in resistance oscillation. We have found anomalous dips in the peak spacing spectra. We show that they can be attributed to the resonant scattering by localized states at the probe-sample contacts. The author was supported through the Global COE Program, "Global Center of Excellence for Mechanical Systems Innovation," by the Ministry of Education, Culture, Sports, Science and Technology.

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