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**Seiji Nishioka\*** ([nishioka@gem.aoyama.ac.jp](mailto:nishioka@gem.aoyama.ac.jp)), 5-10-1 Fuchinobe, Chuo-ku, Sagami-hara-shi, Kanagawa 252-5258, Japan. *Solvability of difference Riccati equations.*

I will talk about my result on solvability of difference Riccati equations in the sense of Franke's generalized Liouvillian extension. I use valuation rings to characterize Franke's extension. The result is the following. If a difference Riccati equation which never turns out to be linear by iterations has a solution in some Franke's extension, then one of the iterated Riccati equations has an algebraic solution. I supposed that the coefficient field is an inversive difference field. Applying this result, one conclude unsolvability of the  $q$ -Airy equation and the  $q$ -Bessel equation with a parameter of rational number when  $q$  is a transcendental number. (Received August 19, 2011)