Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SGD001-P08 Room: Convention Hall Time: May 27 17:15-18:45

Round-trip system used in the Korea VLBI system for Geodesy (KVG)

Tetsuro Kondo[1*], Hongjong Oh[2], Sangoh Yi[2], Jinoo Lee[2], Tuhwan Kim[2]

[1]National Institute of Information and Co, [2]Ajou University

A geodetic VLBI station with a 22-m diameter antenna will be newly constructed in Korea by the National Geographic Information Institute, Korea (NGII) for the project named Korea VLBI system for Geodesy (KVG) that aims at maintaining the Korean geodetic datum accurately. The KVG project has started officially since October, 2008 and construction of all system will be completed in 2011. A new geodetic VLBI station will be constructed at the top of small mountain (height is 150 m) in Sejong city (about 120km south from Seoul and about 20 km north-northwest from Daejeon). National Institute of Information and Communications Technology, Japan (NICT) has exchanged MOU with NGII regarding the development of geodetic VLBI system and has been assisting KVG's technical development. The project is now entering the 2nd year, and reference signal distribution system will be developed in this year. In the reference signal distribution system so-called round-trip system will be adopted to reduce the effect of cable length variations on reference signal transmitted from an observation building to an antenna receiver cabin. Moreover it is designed so as to be able to measure the change of cable length directly. It is also designed to be able to use either a co-axial cable or optical fiber cables.

Reference signal (frequency f0) is not directly transmitted from an observation room (TX-side) to an antenna receiver cabin (RX-side) in the round-trip system, but indirectly transmitted as follows. There is an oscillator (with frequency f2) in the RX-side, and it is transmitted to the TX-side through a cable. Reference signal f0 is mixed with this f2 signal and frequency f1 (=f0-f2) signal is generated at the TX-side. This f1 signal is transmitted to the RX-side through the same cable used for transmitting f2 signal, and it is mixed with f2 signal at the RX-side to regenerate f0 signal. Reference signal regenerated this way is robust against the change of cable length used for signal transmission. Phase change of f0 signal due to cable length change is suppressed to |f1-f2|/(f1+f2) compared with that of f0 signal transmitted directly. We will adopt f0=1400MHz, f1=689.9MHz, f 2=710.1MHz for KVG system, so phase variation will be suppressed to as low as about 1.4% level. In order to measure the change of cable length, differential signal, f1-f2, is generated at the RX-side then it is transmitted to the TX-side. At the TX-side the differential signal is also generated from f2 signal transmitted from the RX-side and f1 signal at the TX-side. The cable length change can be obtained by measuring the phase difference between these two differential signals (one is transmitted from the RX-side and the other is that generated at the TX-side).

Round-trip system for the KVG system will be developed by the summer of this year (2010), and then we will evaluate the performance of system at Kashima VLBI station.

Keywords: round-trip system, VLBI, Korea Geodetic VLBI