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HIGH PRECISION ONE-WAY DOPPLER MEASUREMENT EXPERIMENT OF NEW HORIZONS BASED ON CHINA'S DEEP SPACE NETWORK ANTENNA

Abstract

NASA's probe of New Horizons was successful to flyby the Pluto in July, 2015. In this flyby duration, one of China's deep space network antenna, whose anteena diameter is 66 meters, participated in observing New Horizons by one-way radio signal receiving, to detect the downlink carrier frequency effectively. The observation expriment shown that China's deep space network antenna have tracked successfully the probe and gained the obvious and effective radio downlink signal in X band, meanwhile, SNR of the received signal was not very low with the observation distance about 4.7 billion. Subsquently, one-way Doppler frequency was obtained by frequency detecting method which utilized CZT algorithm. The precison (standard diviation error) of Doppler frequency dectecting was lower than 20 mHz, which was corresponding to the velocity measurement precison lower than 0.7 mm/s. This observation exprement of New Horizons effectively verifed the performance of China's deep space network antenna for super far deep space measurement.