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Instrumentation for a new Geodetic VLBI observing technique

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Geodetic Very Long Baseline Interferometry (geodetic VLBI) is one of the modern space techniques used for measuring very small variations of positions in space and on the Earth. The observing technique widely used at present observes one-source-at-a-time from one or more baselines and models the measured time delay (and derivatives) as functions of baseline vector, source position, geophysical processes, etc. This observing and analysis technique requires prolonged observations and is fraught with singularity problems. This Paper considers instrumentation for a new geodetic VLBI observing technique which, in the opinion of the author, is more efficient than the existing technique. The new technique observes five or more radio sources simultaneously (instead of one-at-a-time) from a single baseline and uses the time delays (and derivatives) measured at a single epoch (~ 20 minutes) to determine accurate values for precession-nutation, polar motion, instantaneous rotation rate of the earth, baseline vector and the positions of the observed radio sources simultaneously. Various instrumentation strategies for the practical realization of the new technique, including modification of existing instruments, are considered. Electronic considerations are however not treated.