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Quasometry, Its Use and Purpose

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Quasometry is precision measurement of celestial positions and apparent motion of very distant extragalactic objects, such as quasars, galactic nuclei, and QSOs. We use this term to identify a specific area of research, the methodology of which differs from that of general astrometry. The main purpose of quasometry is to link the sub-milliarcsecond radio frame (ICRF) with the existing and emerging optical reference frames of similar accuracy, constructed by astrometric satellites. Some of the main difficulties in achieving this goal are discussed, e.g., the extended structures of quasar hosts, apparent motion on the sky, optical variability, galactic companions, faintness. Besides the strategic purpose, quasometry is undoubtedly useful for global astrometric surveys, as it helps to verify or even correct the resulting reference frames. There are two options of using measurements of distant quasars in a global astrometric solution: 1) hard constraints embedded in the fabric of observational equations; 2) {\it a posteriori} fitting of zonal errors. The relative benefits and shortcoming of the two options are reviewed. A relatively small set of about 200 carefully selected reference quasars can go a long way in improving the astrometric value of a space mission, if they are sufficiently bright, stable, fairly uniformly distributed on the sky, and are defining sources in the ICRF. We present an ongoing program at the USNO to construct a quality set of optical quasars with the required properties and to enhance the ICRF with new sources in the areas where known, well-observed quasars are scarce.

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