

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
Space-Based Navigation Systems and Services (6)

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USING PULSATING SOURCES FOR DEFINING A RELATIVISTIC SPACE-BASED NAVIGATION  
SYSTEM

**Abstract**

Pulsating sources can be used for defining a relativistic positioning and navigation system, based on the use of null four-vectors in a flat Minkowskian spacetime. We describe our approach and discuss the validity of it and of the other approximations we have considered in actual physical situations. As a prototypical case, we show how pulsars can be used to define such a positioning system: the reception of the pulses for a set of different sources whose positions in the sky and periods are assumed to be known allows the determination of the user's coordinates and spacetime trajectory, in the reference frame where the sources are at rest. We discuss an application example in which we reconstruct the world-line of an idealized Earth in the reference frame of distant pulsars and, after pointing out the simplifications we have made, we discuss the accuracy of the method. Eventually, we suggest that the method could actually be used for navigation across the Solar System and be based on artificial sources, rather than pulsars.