1125-41-1710 **Erik I Verriest*** (erik.verriest@ece.gatech.edu), School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0250. *An extension of Lagrange-Burman Inversion with Application to Positioning via Delayed Signals.*

The problem of inversion of implicit equations $\tau(t) = Bx(t) + Cx(t - \tau(t))$, with $\tau : \mathbb{R} \to \mathbb{R}^n$ known and $x : \mathbb{R}- \to \mathbb{R}^n$ is addressed. This generalizes the Lagrange-Burman inversion With $\dot{x} = Ax$, conditions for observability, extending the PBH-tests are derived. Various scenarios for the problem of positioning of mobile units (MU) in the ocean are solved with finite speed (c) signalling. It is assumed that the emitted signals provide delay information, $\{\tau_i(t)\}$, and that the positions $\{R_i\}$ of stationary platforms are known. In a first scenario, each mobile unit (MU) transmits a signal, which is received after transmission delay by the stationary platforms. In the second scenario, the MU's are passive and only scatter sonar signals transmitted by the platforms. The problem lies in the fact that the transmission delay τ depends on the line-of-sight distance the mobile units had τ seconds ago. This leads to an implicit nonlinear relation between position and observed delays. For a single MU, these implicit equations take the form $c\tau(t) = \|r(t - \tau(t)) - R_i\|$ and $c\tau(t) = \|r(t) - R_i\| + \|r(t - \tau(t)) - R_i\|$ respectively, where $r(t)$ is the position vector of the MU. (Received September 18, 2016)