

GPS9-1: Receiver Technology

MM9: September 7, 14.30, room NJV14 3-119

Purpose

The purpose of this lecture is to introduce the GPS and other GNSS signals and the spread spectrum technique.

Subjects

- Spread Spectrum Technique
 - Correlation and other signal properties
 - PRN Codes
- GPS Signal
 - Codes, carriers, navigation data
 - Signal Bandwidth
 - Signal generator
- Overview of today's and future GNSS signals

Problems

9.1

Load the *mat* file *prn_codes.mat* into your Matlab workspace.

This file is a 32x1023 array containing all 32 PRN codes used in GPS.

Perform an auto-correlation with PRN1 and notice the maximum and minimum values.

Plot the resulting correlation.

Hint: The correlation between two sequences can be calculated as

$$R_{xy}(n) = \sum_{l=0}^{1022} x(l) \cdot y(l+n)$$

9.2

Perform a cross-correlation between PRN1 and PRN2 and notice the maximum and minimum values.

Plot the resulting correlation.

9.3

Load the *mat* file *unknown_prn.mat* into your Matlab workspace.

Examine which of the 32 GPS satellites that transmitted this code.

Hint: use correlation!

Determine the code phase* of the unknown code.

* The code phase is the location of the beginning of the PRN code in a sequence.