

Introduction to Matlab

Lab 1, DSP

Objective

Introducing students to the Matlab development environment.

Theoretical aspects

The following aspects shall be explained

1. Matlab windows. Working in command line and with script files
2. Scalar-based operations
 - defining scalar variables
 - arithmetic operations with scalars
 - logical operations (comparisons etc)
 - trigonometric functions and constants (pi)
 - other functions (exponential, logarithm)
3. Array-based operations (vectors / matrices)
 - defining constant arrays
 - defining vectors via start:stop:step
 - array indexing, access to elements, modifying some values
 - arithmetic operations with arrays
 - element-wise operations
 - logical operations (comparisons etc) with arrays
 - functions applied to arrays (trigonometric, mathematical functions, length/min/max/sum, etc)
 - concatenation of arrays
 - graphical representation of a vector

Exercises

1. Define two variables $a = 5$ and $b = 0.3$ and compute $a + b$, $\frac{a}{b}$, a^b , $e^{a+\ln(b)}$, $\sin(a) + \cos(b + \frac{\pi}{2})$
2. Define a vector A with 10 zeros, a matrix B with 4×6 elements equal to 1, and a vector C with odd numbers from 1 to 21
 - Change the third element of A to 5
 - Change element $B(2, 4)$ to 7
 - Square all the elements of C , and save the result as a new vector D .
 - Compute $E = 4 * C - 50$.
 - Compare element-wise the vectors C and E . How many elements of C are larger than the corresponding elements from E ?
 - Apply $\sin()$ to all the elements of D
3. Define a vector t with 1000 elements uniformly spaced between 0 and 10. Compute and plot $\cos(2\pi ft)$, where $f = 0.5$.
4. Plot the signal $\sin(2\pi ft + \frac{\pi}{4})$, with $f = 0.2$, for a duration of 3 periods.

Final questions

1. TBD