Calculus with MATLAB

MATLAB provides tools for symbolic and numerical calculus. You can compute derivatives, integrals, limits, and solve differential equations symbolically using the Symbolic Math Toolbox[1].For numerical calculus, MATLAB offers functions like `diff`, `integrate`, and `ode45` for solving ordinary differential equations.

1. **Symbolic Calculation**

   - Symbolic Math Toolbox allows you to work with symbolic expressions, perform algebraic manipulations, and solve equations symbolically.

   - Use functions like `sym`, `solve`, and `simplify` to manipulate symbolic expressions.

2. Numerical Calculation

   - MATLAB excels at numerical computations. You can perform matrix operations, solve linear systems, and optimize functions using built-in functions.

   - Explore functions like `sum`, `mean`, `eig`, and `fminunc` for numerical calculations.

3.Matrix Calculation

   - MATLAB is renowned for its matrix capabilities. You can multiply matrices, compute determinants, and find eigenvalues.

   - Functions like `dot`, `cross`, and `inner` handle inner products and cross products.

4.Parametric Plot (2D, 3D)

   - Use `plot` or `plot3` to create parametric plots. Specify functions of a parameter (e.g., time) to visualize curves in 2D or 3D.

   - Example: `t = linspace(0, 2*pi, 100); plot3(cos(t), sin(t), t)`.

5.Polar, Spherical, and Cylindrical Coordinates

  - MATLAB supports coordinate transformations. Convert between Cartesian, polar, spherical, and cylindrical coordinates.

  - Functions like `cart2pol`, `cart2sph`, and `cart2cyl` handle these conversions.

6.Multivariable Plot

  - Visualize multivariable functions using 3D plots or contour plots.

  - For 3D plots, use `surf` or `mesh`. For contour plots, try `contour` or `contourf`.