CORDIC Algorithm

Floating Simulation Description

It is clear that CORDIC can be combined by independent elements, which each one complete one steps in the formula.



And a high level function will handle the error measurement and calculation order decision for one certain initial value. While the highest function is design to scan the entire value domain.

# CORDIC Element Function

There are several inputs for the function, as that x\_k, y\_k, z\_k, referring the formula, and order: element order equals k, and that mode is the CORDIC mode in which mode(1): rotate mode and triangle for 1; linear for 2; hyperbolic for 3 as well as mode(2): ending mode and z to 0 for 1; y to 0 for 2.

The output x\_k1, y\_k1, z\_k1 are the results in the formula.

After the coefficients of e\_k and u are selected depending on parameter mode, the results by the formula can be obtained.

# Certain Angle Function

There are several inputs for the function, where w is value for calculation, and err\_limitation is the allowed maximum error, and mode is CORDIC mode as same as defined in CORDIC element function.

There are some outputs also. The value is/are calculation result(s), and order is the CORDIC order to reach the error limitation, and real\_value is the result(s) value from the MATLAB function, and err is the CORDIC error against to the real\_value.

After selection for constant K/K', initial values are selected considering parameter mode. There will be a loop to increase the order until the error can be acceptable.

# Value Domain Scan Function

The inputs, where step is the number of scanning step in the entire value domain, and err\_limitation is the allowed maximum error, and mod is CORDIC mode as same as defined in CORDIC element function.

There are some outputs also. The order is the CORDIC order to reach the error limitation, and max\_err is the maximum CORDIC error from the real value.

The value domain depends on the parameter mode. And after one scanning loop to get the maximum order in the domain, there will be another loop to get the maximum error in the angles.

# Certain Angle and Certain Order Function

After the simulation, the function was found necessary for the project.

There are several inputs for the function, where w is value for calculation, and order is required calculation order, and mode is CORDIC mode as same as defined in CORDIC element function.

There are some outputs also. The value is/are calculation result(s), and real\_value is the result(s) value from the MATLAB function, and err is the CORDIC error against to the real\_value.

After selection for constant K/K', initial values are selected considering parameter mode. There will be CORDIC calculations.