//@version=2

// MESA Adaptive Moving Average

// aka: Mother of Adaptive Moving Averages

// Creator: John EHLERS

//author: KIVANÇ @fr3762 on Twitter

study("MAMA by EHLERS", shorttitle="MAMA", overlay=true)

Price=input(hl2, title="Source")

fastlimit=input(0.5, title="Fast Limit")

slowlimit=input(0.05, title="Slow Limit")

smooth = (4\*Price + 3\*Price[1] + 2\*Price[2] + Price[3])/10

detrender = (0.0962\*smooth + 0.5769\*nz(smooth[2]) - 0.5769\*nz(smooth[4])- 0.0962\*nz(smooth[6]))\*(0.075\*nz(Period[1]) + 0.54)

q1 = (0.0962\*detrender + 0.5769\*nz(detrender[2]) - 0.5769\*nz(detrender[4])- 0.0962\*nz(detrender[6]))\*(0.075\*nz(Period[1]) + 0.54)

i1 = nz(detrender[3])

jI = (0.0962\*i1 + 0.5769\*nz(i1[2]) - 0.5769\*nz(i1[4])- 0.0962\*nz(i1[6]))\*(0.075\*nz(Period[1]) + 0.54)

jq = (0.0962\*q1 + 0.5769\*nz(q1[2]) - 0.5769\*nz(q1[4])- 0.0962\*nz(q1[6]))\*(0.075\*nz(Period[1]) + 0.54)

i21 = i1 - jq

q21 = q1 + jI

i2 = 0.2\*i21 + 0.8\*nz(i2[1])

q2 = 0.2\*q21 + 0.8\*nz(q2[1])

re1 = i2\*nz(i2[1]) + q2\*nz(q2[1])

im1 = i2\*nz(q2[1]) - q2\*nz(i2[1])

re = 0.2\*re1 + 0.8\*nz(re[1])

im = 0.2\*im1 + 0.8\*nz(im[1])

p1 = iff(im!=0 and re!=0, 2\* 4 \* atan(1)/atan(im/re), nz(Period[1]))

p2 = iff(p1 > 1.5\*nz(p1[1]), 1.5\*nz(p1[1]), iff(p1 < 0.67\*nz(p1[1]), 0.67\*nz(p1[1]), p1))

p3 = iff(p2<6, 6, iff (p2 > 50, 50, p2))

Period = 0.2\*p3 + 0.8\*nz(p3[1])

SmoothPeriod = 0.33\*Period + 0.67\*nz(SmoothPeriod[1])

Phase = 180/(4 \* atan(1))\*atan(q1 / i1)

DeltaPhase1 = nz(Phase[1]) - Phase

DeltaPhase = iff(DeltaPhase1< 1, 1, DeltaPhase1)

alpha1 = fastlimit / DeltaPhase

alpha = iff(alpha1 < slowlimit, slowlimit, iff(alpha1 > fastlimit, fastlimit, alpha1))

MAMA = alpha\*Price + (1 - alpha)\*nz(MAMA[1])

FAMA = 0.5\*alpha\*MAMA + (1 - 0.5\*alpha)\*nz(FAMA[1])

plot(MAMA, title="MAMA", color=blue, linewidth=2)

plot(FAMA, title="FAMA", color=maroon, linewidth=2)