6/2/2011 (c) Ether
SWERVE FORWARD KINEMATICS CALCULATOR   script for maxima 5.24.0   http://maxima.sourceforge.net/

(%i41) kill(all)$
       load("minpack")$

*** USER ENTERS DATA IN CELL IMMEDIATELY BELOW ***

(%i2) L: 30$ W: 24$ /*wheelbase and trackwidth in inches*/

       sFR: 6.6146087960253$ /*wheel tangential speeds in feet/second*/
       sFL: 9.6813559654012$
       sRL: 7.4997966956141$
       sRR: 2.5042656950073$

       aFR: 1.183014673400058$ /*wheel angles in radians clockwise from straight ahead*/
       aFL: 0.6847789579122$
       aRL: -0.016464555187806$
       aRR: -0.049325965088199$

*** NO USER DATA ENTRY BEYOND THIS POINT ***

(%i12) R: sqrt(L^2+W^2)$ Lr: L/R$ Wr: W/R$

(%i15) RCW: omega*(R/2)$

(%i16) A: STR-RCW*(Lr)$ B: STR+RCW*(Lr)$ C: FWD-RCW*(Wr)$ D: FWD+RCW*(Wr)$

(%i20) sFR_: sqrt(B^2+C^2)$ sFL_: sqrt(B^2+D^2)$ sRL_: sqrt(A^2+D^2)$ sRR_: sqrt(A^2+C^2)$
       aFR_: atan2(B,C)$ aFL_: atan2(B,D)$ aRL_: atan2(A,D)$ aRR_: atan2(A,C)$

(%i28) Ks: 10$ Ka: 180/%pi$
       s1: Ks*(sFR-sFR_)$ s2: Ks*(sFL-sFL_)$ s3: Ks*(sRL-sRL_)$ s4: Ks*(sRR-sRR_)$
       a1: Ka*(aFR-aFR_)$ a2: Ka*(aFL-aFL_)$ a3: Ka*(aRL-aRL_)$ a4: Ka*(aRR-aRR_)$

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(%i38) function_list: [s1,s2,s3,s4,a1,a2,a3,a4]$
       "FORWARD KINEMATIC SOLUTION:";
       sol: minpack_lsquares(function_list,[FWD,STR,omega],[.1,.1,.1]);
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(%o39) *FORWARD KINEMATIC SOLUTION:*

(%o40) $[[5.0,2.999999999999988,0.20823168251814],2.8897053072721709\,10^{-13},2]$

The solution given in the cell immediately above is, respectively,
- the vehicle forward speed in feet/second;
- the vehicle strafe right speed in feet/second;
- the vehicle clockwise rotation in radians/second;
- the "goodness of fit*;
- and finally a return status from the function (see maxima user docs)

*this gives the accuracy, in +/- tenths of a ft/sec and +/- degrees, of the
 inverse kinematic solution for wheel speeds and wheel steering angles
 associated with the forward kinematic vehicle motion solution given above.