```
A Kinematics
                                                                                                         - Dynamics
                                                                                                                                                                                                     - Dynamics control
A Generalized coordinates
                                                                                                          M & + b + b = T + J T R come when
                                                                                                                                                                                                         age
       R= [ 86 ] buce $6 = [ 86p] (SEB)
                                                                                                                                                                                                        -M(2) in + b(2, w) + 8(2) + ITE =5 =
                                                                                                          M(4) in+ b(5, m) + 0(3) = 5T+ JEFE
                                                                                                                                                                                                         · it = Thu
 A Generalized velocines
                                                                                                                                                                                                             re= Jein+ Jen+o
   \mathcal{U} = \begin{bmatrix} z \vee g \\ \partial \mathcal{W}_{2B} \\ \dot{\varphi}_{1} \end{bmatrix} \quad \dot{u} = \begin{bmatrix} \mathcal{L} & g \\ \partial \mathcal{W}_{2B} \\ \dot{\varphi}_{1} \end{bmatrix}
                                                                                                      g_{n} = \begin{bmatrix} g_{1} \\ g_{2} \end{bmatrix} \text{ and county joints} \\ g_{n} = \begin{bmatrix} g_{1} \\ g_{2} \end{bmatrix} \text{ accounty joints} \\ \text{where such gold is a support } = \text{In} \text{ III} \begin{bmatrix} u_{0} \\ g_{2} \end{bmatrix}
                                                                 € R***3
                                                                                                                                                                                                         · Fo = ( [ M - ] ] - ( Tom - 15 T-6-8) - ( u)
                                                                                                                                                                                                        - No = I-M" Je" ( JeM" Je") " Je
             ( to ] [ 40 ]
                                                                                                                                                                                                         - No (Mg + b-8) = No 572
   U. = Eq. 6 . Cop = Liver Eq. Injury
                                                                                                        > Mij+6+g= ₹ + J'Fe
                                                                                                      Might be get TTE
                                                                                                                                                                                                           T" = (NE"ST) TNJ (ME+6+8)
                                                                                                                                                                                                          t" = (NEST) "NET(ME+b+9) + N(NEST) to
A Py of a pt on the mobile
This (f) = I has (f) + Gally anally
                                                                                                                                                                                                         sinducing QP
                                                                                                       △ Saft connect
   IVa=IVa+ Cza-aR-an+Cza-phan
                                                                                                           physical accuracy v. numerical study
                                                                                                                                                                                                         min | Aix - bille
          = xVB + Cxs[anks] x allea + GB Black
                                                                                                      A Hand contect
         = zva - Czalanea Ixanea - Cza anac
                                                                                                                                                                                                             W X= FO
                                                                                                           · colased contect
                                                                                                                                                                                                        ()
M($) i. + b(e, w) + 9(8) + I/F = 5/2
                                                                                                     N=0

N=0

N=0

Near complement constant
      = [Ina - Ges to real - Ges - ota (E)] a
                                                                                                                                                                                                         = A = [A Î -S]
       = = Tale) u
                                                                                                                                                                                                             b, = -1-3
                                                                                                                  Ë"N ≥ D
 A contact constraints
                                                                                                                                                                                                         (2) Tù + Tu = W*
  - Co . contact point , conner move
                                                                                                                  PN = 0
                                                                                                                                                                                                         ⇒Az=[j; oo] mother
by= 必ずju
    ( ITUIC: = const.
                                                                                                                  #WFN=0
                                                                                                       △ Hard current of an MBS
        I Azcr = 2Jc, N=0
                                                                                                        - MX+6+9 + LTE - STE -0)
                                                                                                                                                                                                        187 Fr - Fr
    I FACE = ITCH + ATCH = 0
                                                                                                        _ sic = Jeg = 0
       Je = [ Je ] + Rangamen
                                                                                                                                                                                                           = A3 = IO I of webs
                                                                                                                AL - Jeg + 168 40
                                                       de de de
                                                                                                                                                                                                                   b = Ft*
                                                                                                         of from (1)
    - Williamie
                                                                                                                                                                                                         (4) may 1 = 112
                                                                                                               1-A'ST- 6-8-JUE)
         0= Ac = I & & 6 - I'0 + Nie = K60
                                                                                                               W/ (2)
                                                                                                                                                                                                             → A=10 01]
          0 = ne = 5.2.7 1 = 6= 5.6-16) + Net.
                                                                                                                                                                                                                   b= 0
                                                                                                           Sic = Jo [M-15 8-6-9-369c)] + Job = 0
    - dinst paloty
                                                                                                                                                                                                             -> Hen solve QP!
          mak 0: We = Jog + Tighto
                                                                                                       + get Fe - contact fusie
Grow (3)
          tosk I: We = Jes + Jes - mat
 - system musclibe to contest conscients
                                                                                                      E=(LM*[5]) (LM*(SE-4=1)+E)

Alen my concerning,
accommiss,
accommi
   A Contact Tocobien
                                                                                                      1. W/ 01)
    - Te = 39 -> constraints ?
                  = [Jc,b Je,j] restrain best war best wa
                                                                                                      > Mg+b+g+ J. Commerce of = 5 to
                                                                                                      > Min +b+q+ Je torresterresterres (€) = 5°E
                  = [ 3/4 3/4] Some
                                                                                                       Me = I - M 12 (2 M 12) 1 J.

Je Ne = Je - Je - Je (2 M 12) 1 J.
     - nombe (Jeb) => base is suy
                                                                                                      = Noting +Notional+
                                                                                                                 WIT CONTINUES OF STATE
             rank (Jo) - rank (Jos)
                 of indpenting contitions no constitutes no partition of the lease
                                                                                                    = Nothing + Nothing) = Nothing
support consistent dynamic
independent of nearming
independent of nearming
impulse transfer @ contact
                      no, of kinemate constructs
                        for just construct
     es. (3)
                                                                                                         Stal (Minbog + Je Fe-STE) de
                                                                                                      = M(W-W) + T_0^2 F_0 = 0 - 0
= M(W-W) + T_0^2 F_0 dt
               TE = RAXF

Xily construints of 2

contain pair
                                                                                                               \dot{\psi}^{c}_{+} = 2^{c} \dot{m}_{+} = 0 --- \epsilon_{3}
            numk(Je) = 4
            amk( 3.6)=3
                                                                                                      => W/60
                                                                                                             W-W-707 76 76 -- (3)
          4-3= ("1" kinematic a
                                of the americas)
                                                                                                      DOW-JOU - JOM JOTE
                                                                                                      = Jew = Jem Jet FE
     a generalized coordinates DON'T
                 correspond to the degree of freedom
                                                                                                      * Fee Meri = Mc Jeu
                                                                                                        - - - - w+ - w (faum (3)
                                                                                                                          = - M Jc 9c
                                                                                                                           = -M+ Jc7_1_c Jc u-
                                                                                                                           = -M"JeTELEM"Jetj-13e et
                                                                                                        is when we mitterest mitty the
                                                                                                                        = []-M"I"(J.M"I")"]. ] W
                                                                                                                         * No W" post-impact vel
                                                                                                              Ne also maps w - w w
```

- Elis = A Exa =-Lawman =-Lawman =-Lawman =-Lawman =-Lawman