In [6]:
```
from IPython.core.display import display, HTML
display(HTML("<style>.container { width:80% !important;}</style>"))

from simu import simulation
%matplotlib inline
simulation("yml\I5O200_19082022.yml")
```

```
v10.1.0 compatible, modified: 19.8.2022, IN 5MeV
------------------------------------------------------------------------
☒  FINAL kinetic energy 199.689 [MeV] ☒
stability X?  0.7063457456416212
stability Y?  1.6242342146052813

phase_advance: X[deg]=69.318495 Y[deg]=35.697

Full Accelerator Matrix (f)<==(i)
PsMkr*QF2*D3*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*R
FG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2
*DGAP2*D10*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG
2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*D
GAP2*D3*QD2*QD2*D3*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*D
GAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP
2*RFG2*DGAP2*D10*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGA
P2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*
RFG2*DGAP2*D3*QF2*QF2*D3*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*D
GAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP
2*DGAP2*RFG2*DGAP2*D10*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*DGA
P2*DGAP2*RFG2*DGAP2*DGAP2*RFG2*D.....1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP
1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*D10*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGA
P1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*
RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*D3*QF1*QF1*D3*DGAP1*RFG1*DGAP1*DGAP1*RFG1*D
GAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP
1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*D10*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGA
P1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*
DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*D3*QD1*QD1*D3*DGAP1*RFG1*DGAP1*DGAP1*
RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG
1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*D10*DGAP1*RFG1*DGAP1*DGAP1*RF
G1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*
DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*DGAP1*RFG1*DGAP1*D3*QF1*PsMkr
  0.4126  -0.4958        0        0        0        0        0        0        0
0
 0.06066   0.2938        0        0        0        0        0        0        0
0
       0        0    1.546  -0.2927        0        0        0        0        0
0
       0        0    0.102  0.07855        0        0        0        0        0
0
```

```
       0        0        0        0  -0.3374   -0.633        0        0        0
0
       0        0        0        0   0.2127 -0.04743        0        0        0
0
       0        0        0        0        0        0        1    194.7        0
0
       0        0        0        0        0        0        0        1        0
0
       0        0        0        0        0        0        0        0        1    333.
6
       0        0        0        0        0        0        0        0        0
1

det|full-cell|=0.00345

det|Mbeta - I|=0.00001

symplectic (+1,-1,+1,-1,+1,-1)?
[+0.15, -0.15, +0.15, -0.15, +0.15, -0.15]

using @ entrance: [beta,  alfa,  gamma]-X    [beta,   alfa,   gamma]-Y
                  [1.902, 0.000, 0.526]-X    [0.351,  0.000,  2.849]-Y
D10             ================= (MKSA units) =================
                                ID : D10
                            length :     0.05
                               sec : ?
                              type : D
D3              ================= (MKSA units) =================
                                ID : D3
                            length :     0.05
                               sec : ?
                              type : D
DGAP1             ================= (MKSA units) =================
                                ID : DGAP1
                            length :     0.01
                               sec : LE
                              type : DKD
DGAP2             ================= (MKSA units) =================
                                ID : DGAP2
                            length :    0.023
                               sec : HE
```

```
                          type : DKD
PsMkr              ================= (MKSA units) =================
                            ID : PsMkr
                        action : pspace
                          type : MRK
QD1                ================= (MKSA units) =================
                            B' :       25
                         Bpole :    0.275
                            ID : QD1
                      aperture :    0.011
                        length :     0.02
                           sec : LE
                         thins :        1
                          type : QD
QD2                ================= (MKSA units) =================
                            B' :       25
                         Bpole :    0.275
                            ID : QD2
                      aperture :    0.011
                        length :     0.02
                           sec : HE
                         thins :        1
                          type : QD
QF1                ================= (MKSA units) =================
                            B' :       25
                         Bpole :    0.275
                            ID : QF1
                      aperture :    0.011
                        length :     0.02
                           sec : LE
                         thins :        1
                          type : QF
QF2                ================= (MKSA units) =================
                            B' :       25
                         Bpole :    0.275
                            ID : QF2
                      aperture :    0.011
                        length :     0.02
                           sec : HE
                         thins :        1
                          type : QF
```

```
RFG1             ================= (MKSA units) =================
                              EzAvg :        1
                             EzPeak :        1
                                 ID : RFG1
                            PhiSync :      -20
                             SFdata : None
                           aperture :     0.01
                               freq : 816.e6
                                gap :     0.02
                            mapping : t3d
                                sec : LE
                               type : RFG
RFG2             ================= (MKSA units) =================
                              EzAvg :        1
                             EzPeak :        1
                                 ID : RFG2
                            PhiSync :      -30
                             SFdata : None
                           aperture :     0.01
                               freq : 816.e6
                                gap :    0.046
                            mapping : t3d
                                sec : HE
                               type : RFG
                  ================== Summary ====================
                          (Dp/p)i spread* : 3.01e-03 impulse
                                 (N)sigma :        2
                       (delta-T/T)i spread : 6.00e-03 kinetic energy
                  (energy)i,(energy)f [MeV] :        5  199.689
                       (phi)i spread* [rad] : 2.88e-01 phase
                          (sigx )i*   [mm] :  1.37913
                          (sigx')i* [mrad] : 0.725095
                          (sigy )i*   [mm] : 0.592453
                          (sigy')i* [mrad] :   1.6879
                        (ttf)min,(ttf)max* : 0.480377 0.921371
                              (w)i spread : 3.20e-05 delta-gamma, dE/E0
                       (z)i spread*    [m] : 1.73e-03 bunch
                                   accON : True
                       emit{phi-w}*  [rad] : 2.93e-05
                       emit{x-x'}[mrad*mm] :        1
                       emit{y-y'}[mrad*mm] :        1
```

```
    emit{z-Dp/p}*  [mm] : 1.66e-02
injection energy [MeV] :        5
            input file : yml\I5O200_19082022.yml
    lattice length [m] :   333.64
       lattice version : I5O200-19.08.2022
        nbof cavities* :     6480
      nbof quadrupoles* :      648
separatrix: DW-max*[MeV] : 4.51e-02 energy
separatrix: Dp/p-max [%] : 4.52e-01 impulse
separatrix: w-max*   [%] : 4.81e-03 delta-gamma
 sync.oscillation* [MHz] :   56.662
          use aperture : False
   use emittance growth : False
       use ring lattice : False
    use sigma tracking : False

CALCULATE C+S TRAJECTORIES

CALCULATE ENVELOPES from TWISS-parameters
PREPARE DISPLAY
```