



rf pattern for tune and COD measurement

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Purpose

Tune and COD measurement at several momenta needs rf pattern with flat top.

Smooth transition from $\phi_{is} = \text{finite}$ to $\phi_{is} = 0$ may increase survival of particles and therefore measurement accuracy.

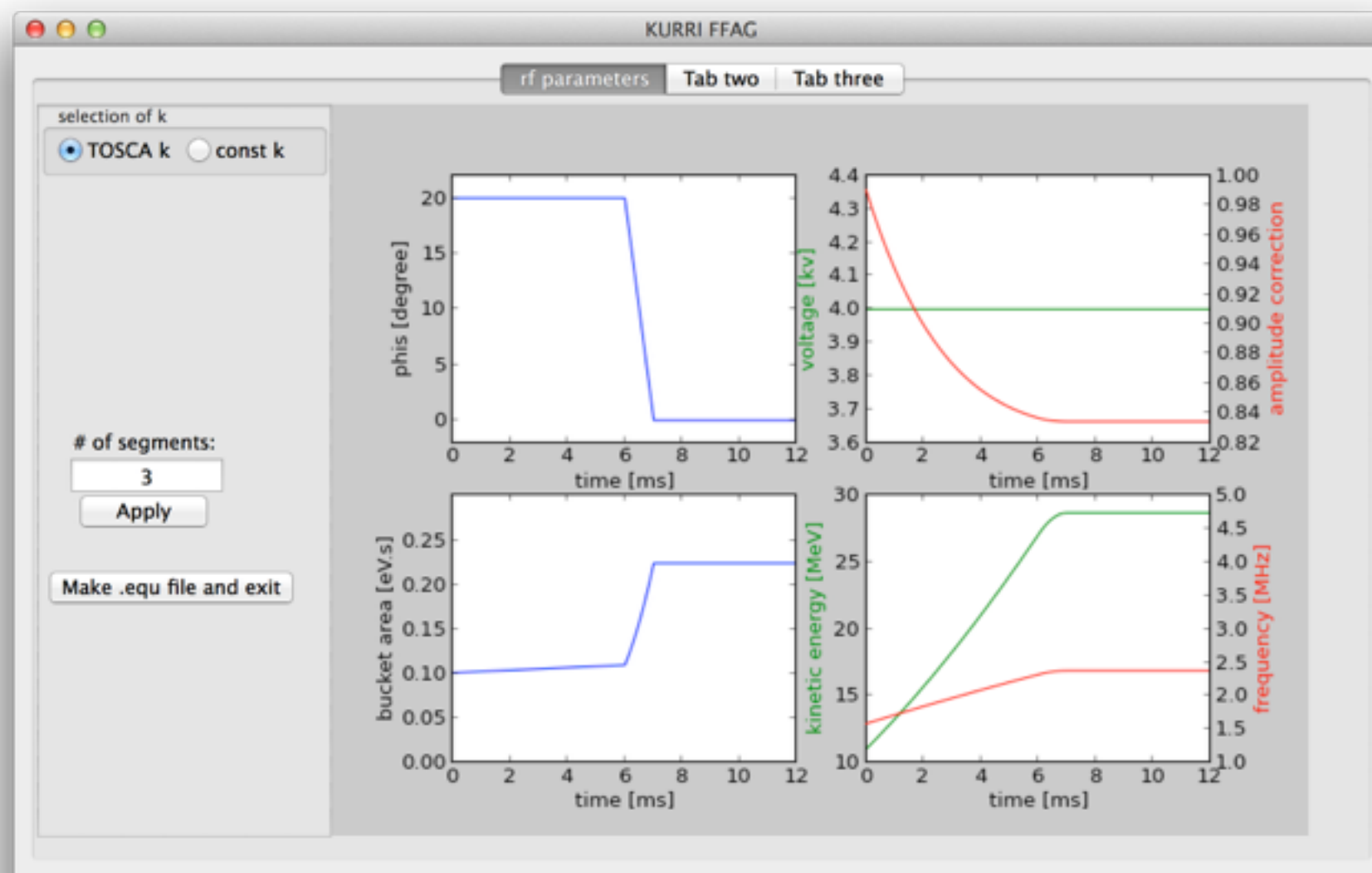
With this new script, it is easy to optimise rf pattern with flat top.

Example 1

Accelerate with $\phi = 20^\circ$ for 6 ms.

Spend 1 ms from $\phi = 20^\circ$ to 0° .

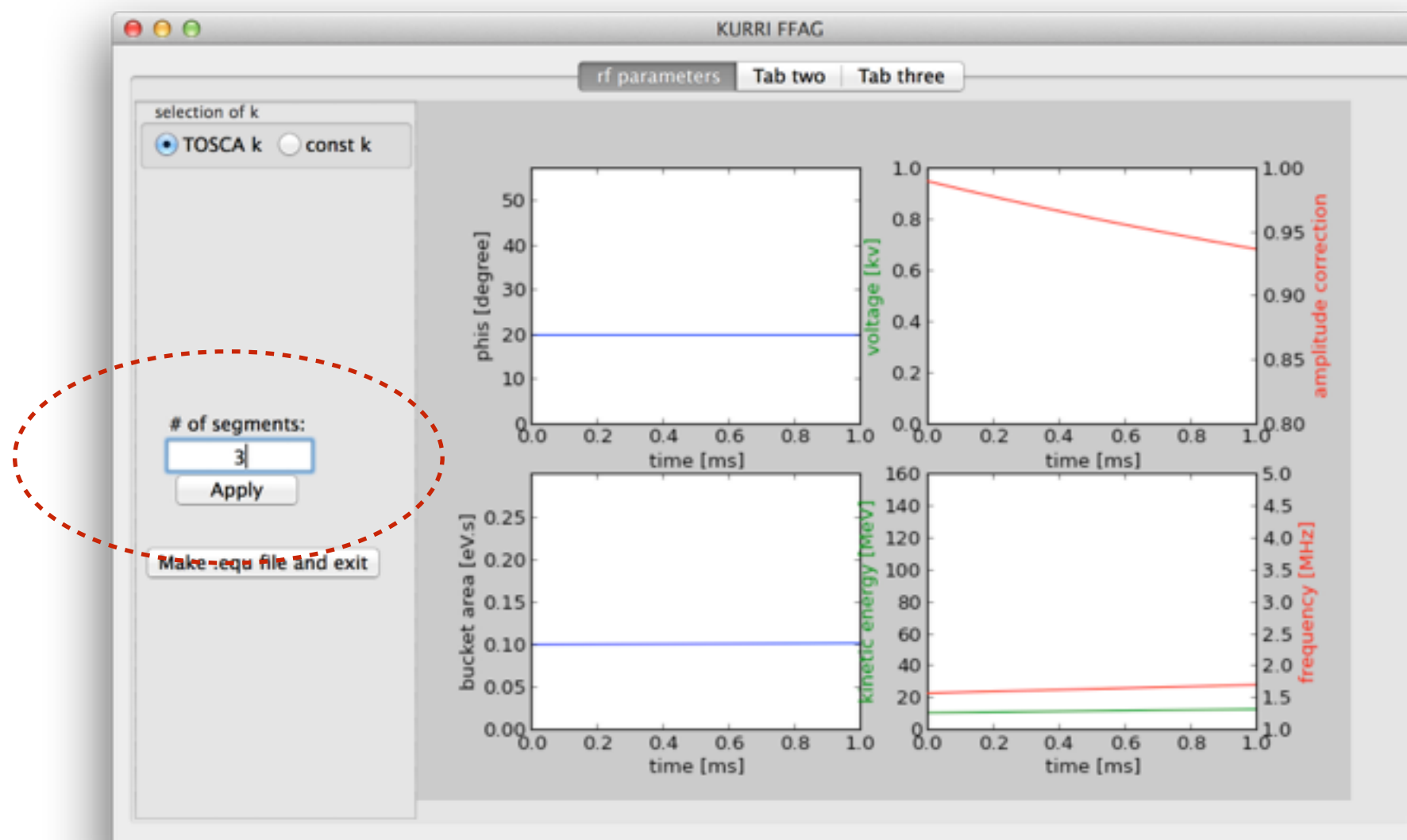
Keep the beam for 5 ms (or more) for measurement.



Example 1

step 1

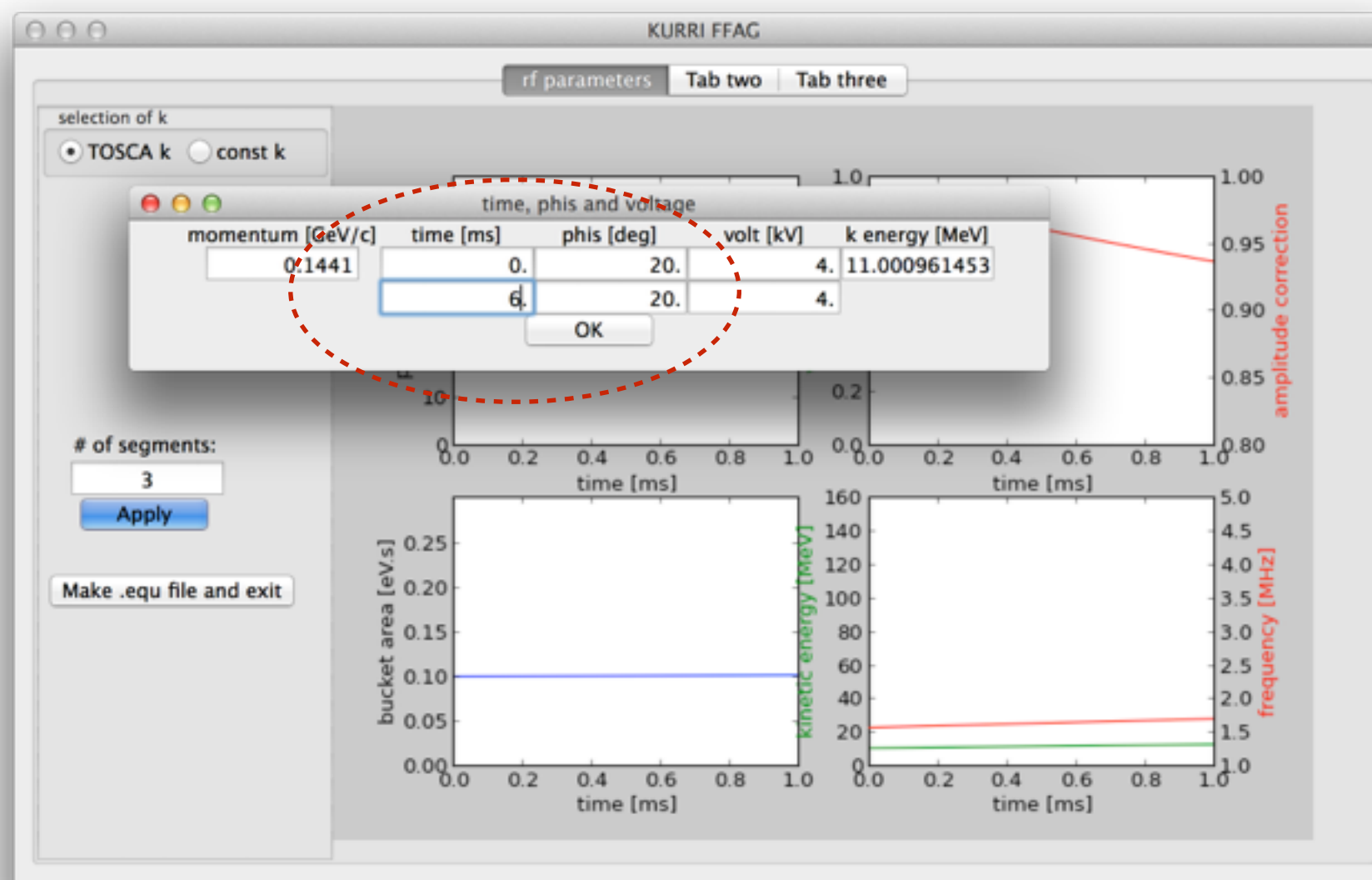
Enter “3” as # of segments.



Example 1

step 2

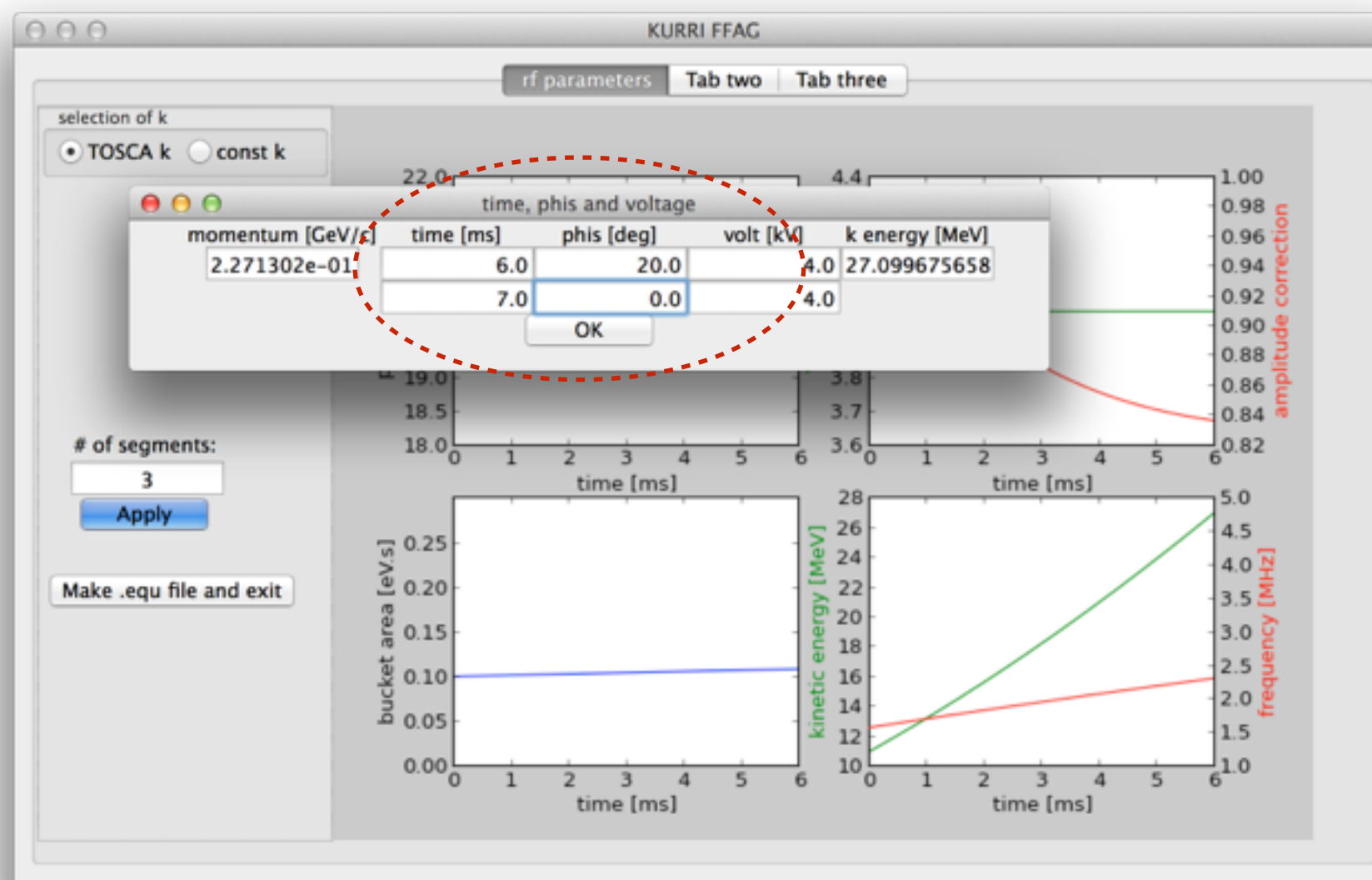
Set time from 0 to 6 ms.



Example 1

step 3

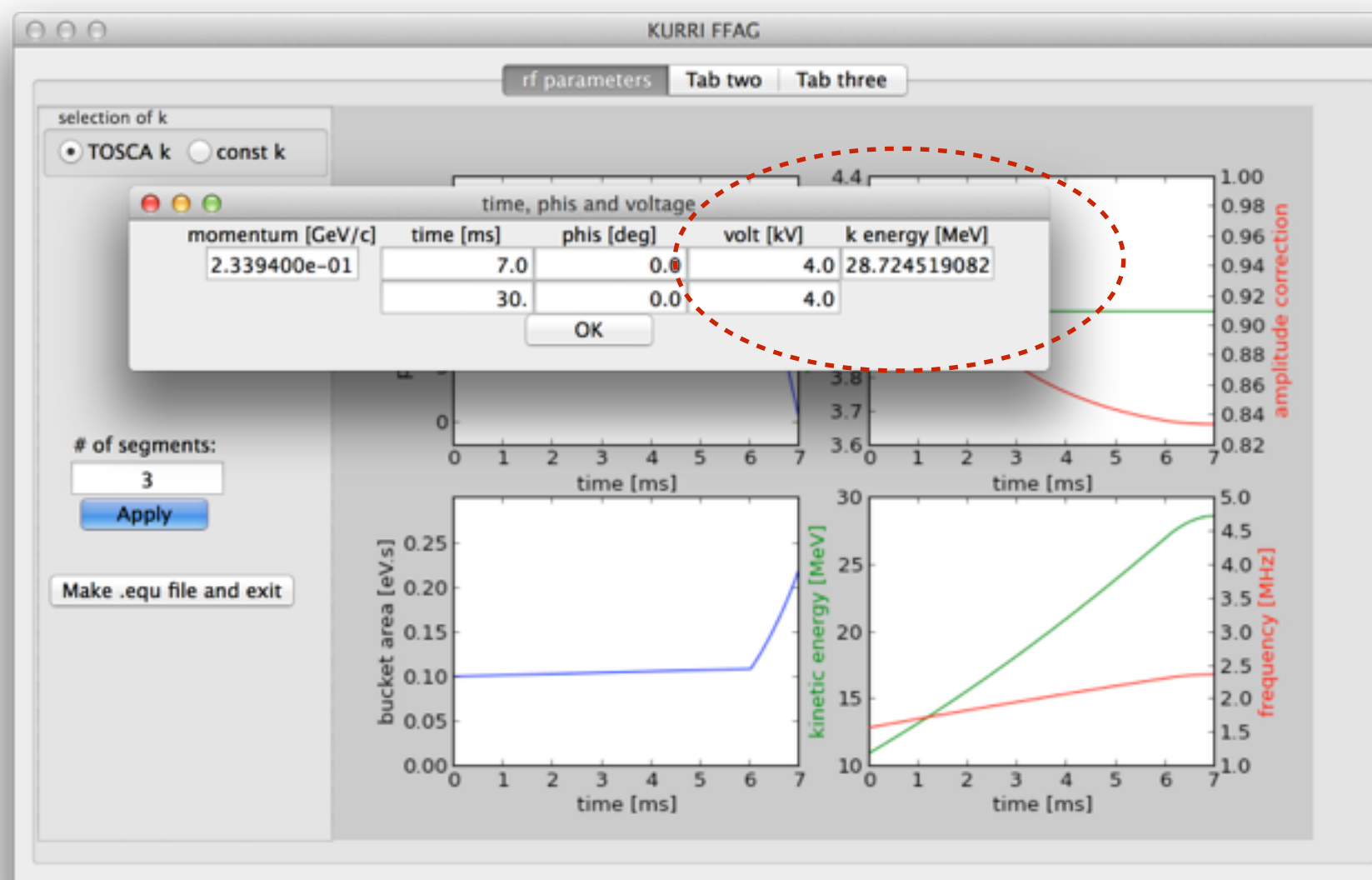
Set time from 6 to 7 ms, phis from 20 to 0 deg.



Example 1

step 4

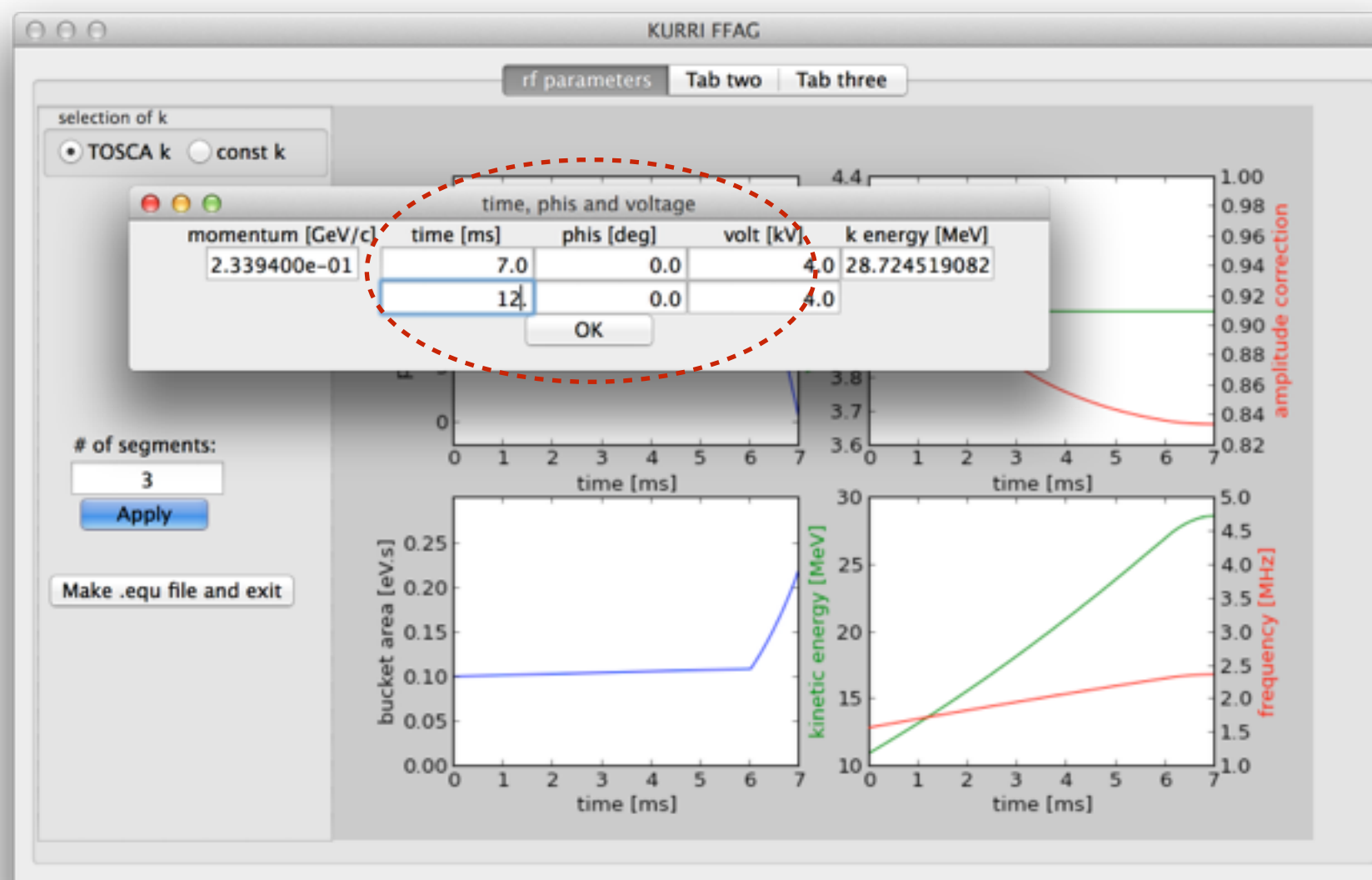
You will see energy is 28.7 MeV at flat top.



Example 1

step 5

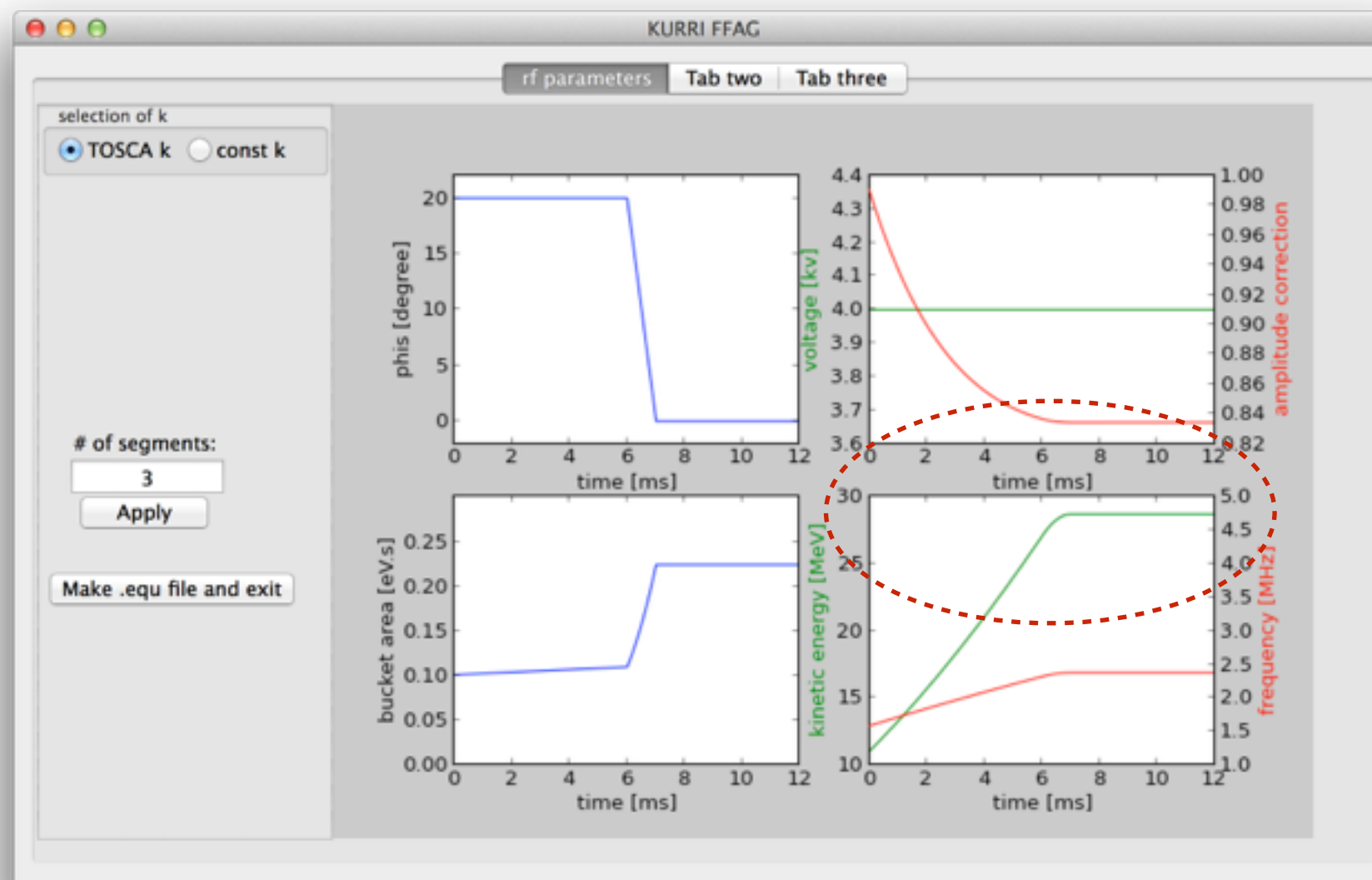
Set time from 7 to 12 ms, phis=0 to 0 deg.



Example 1

step 6

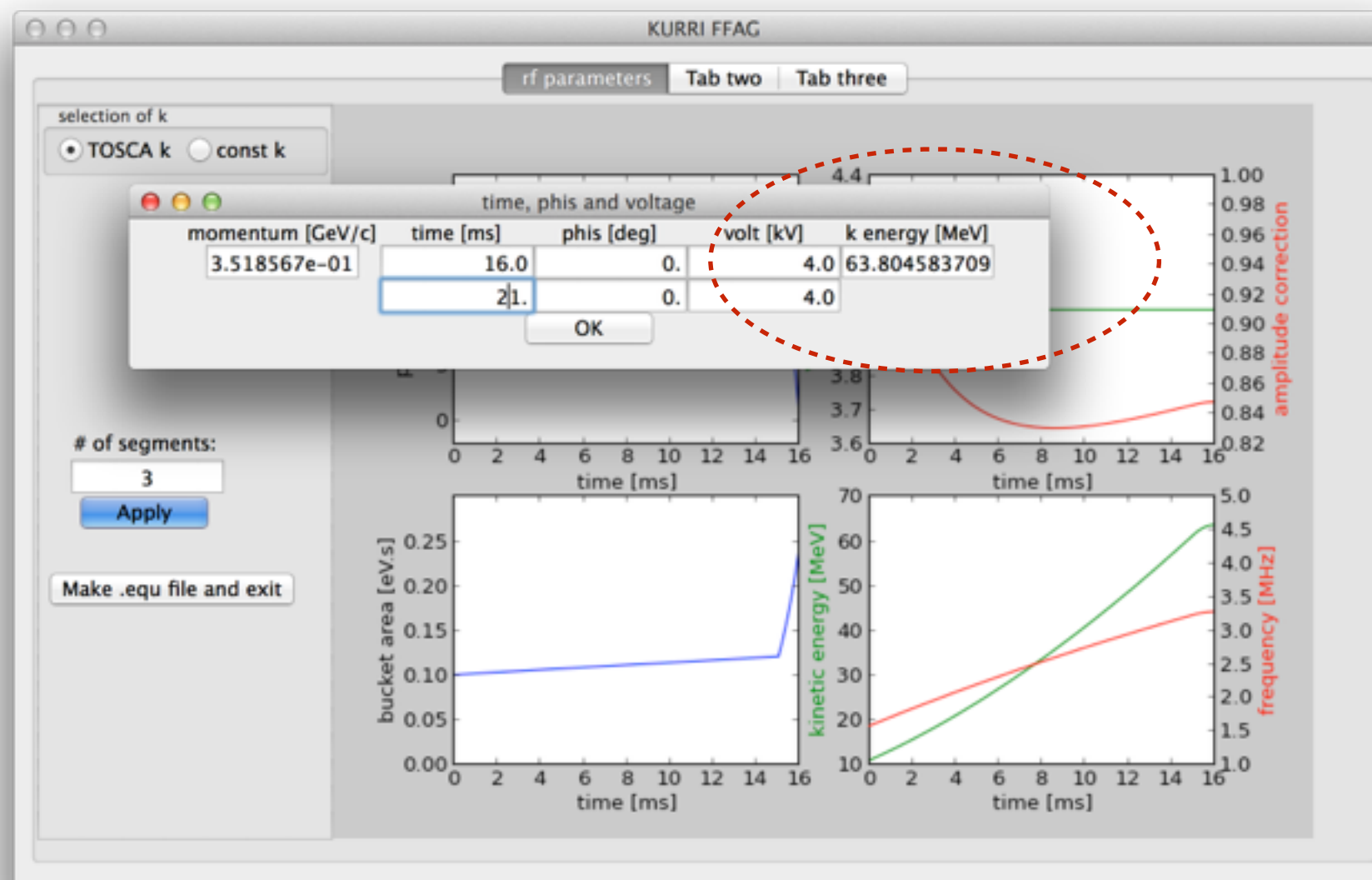
Smooth transition from acceleration to flat top is created.



Example 2

with more acceleration

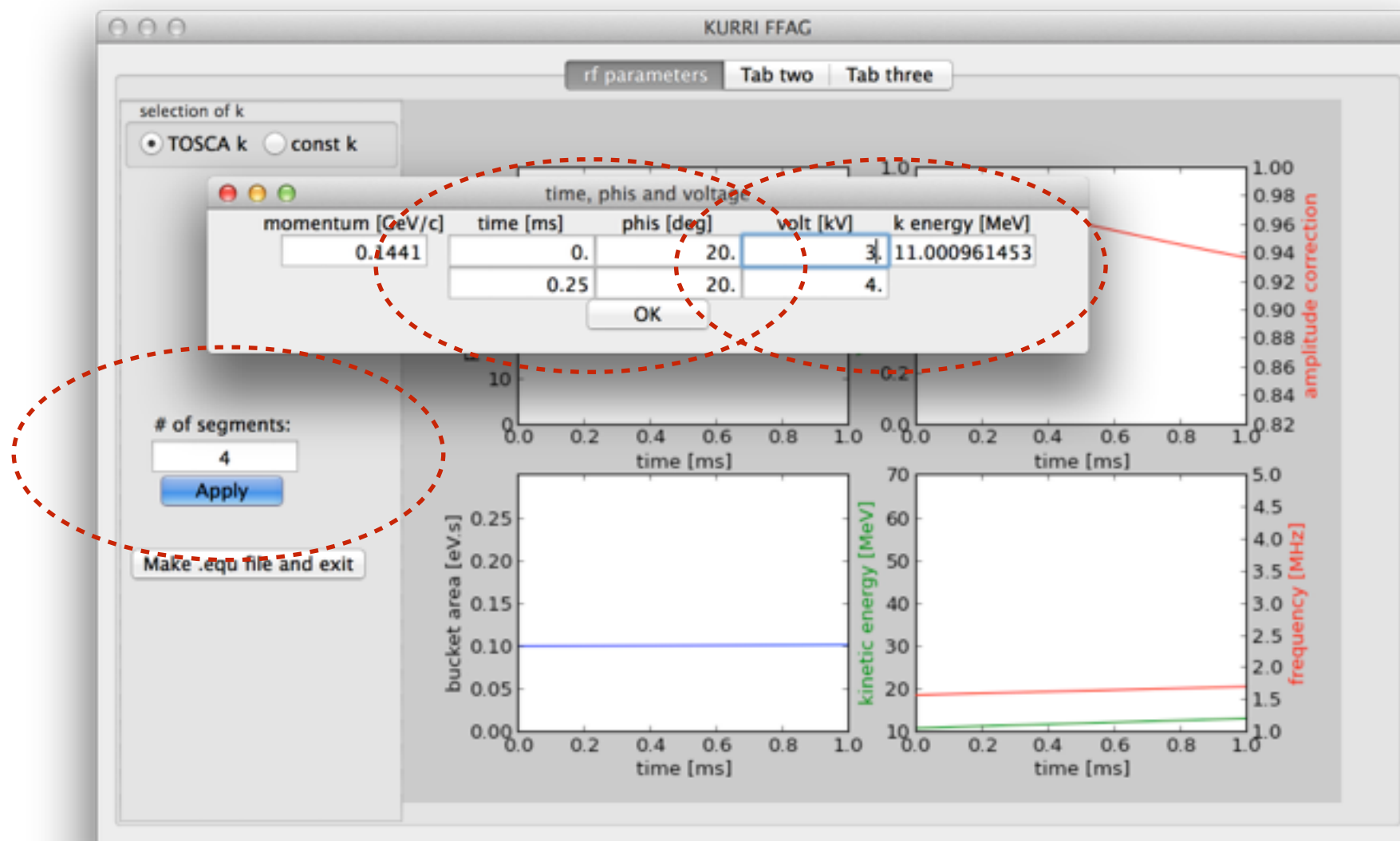
If we spend 15 ms for acceleration and 1 ms for transition, energy becomes 63.8 MeV.



Example 3

add adiabatic capture 1

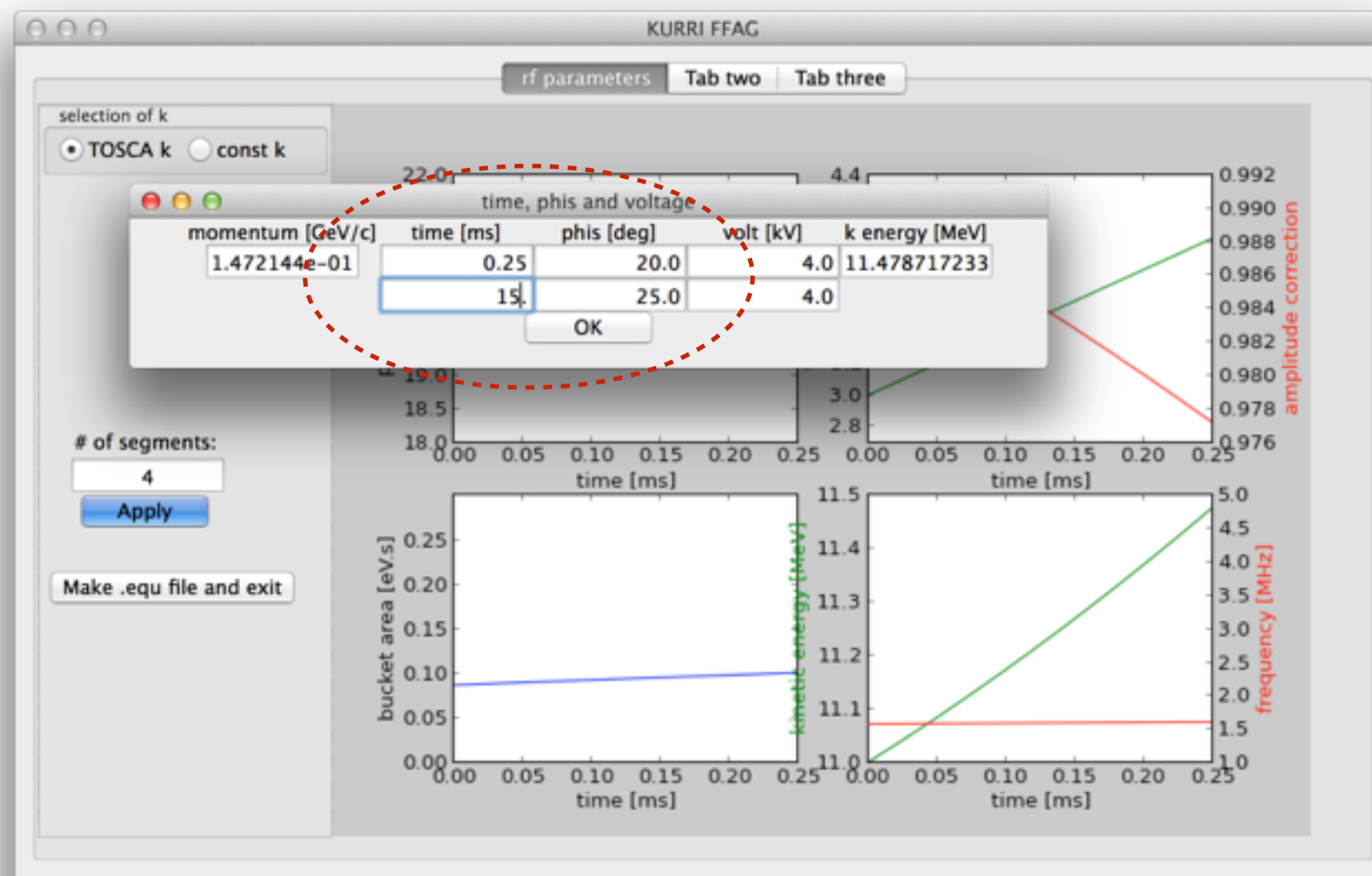
Enter “4” as # of segments, time from 0 to 0.25 ms, voltage from 3 to 4 kV.



Example 3

add adiabatic capture 2

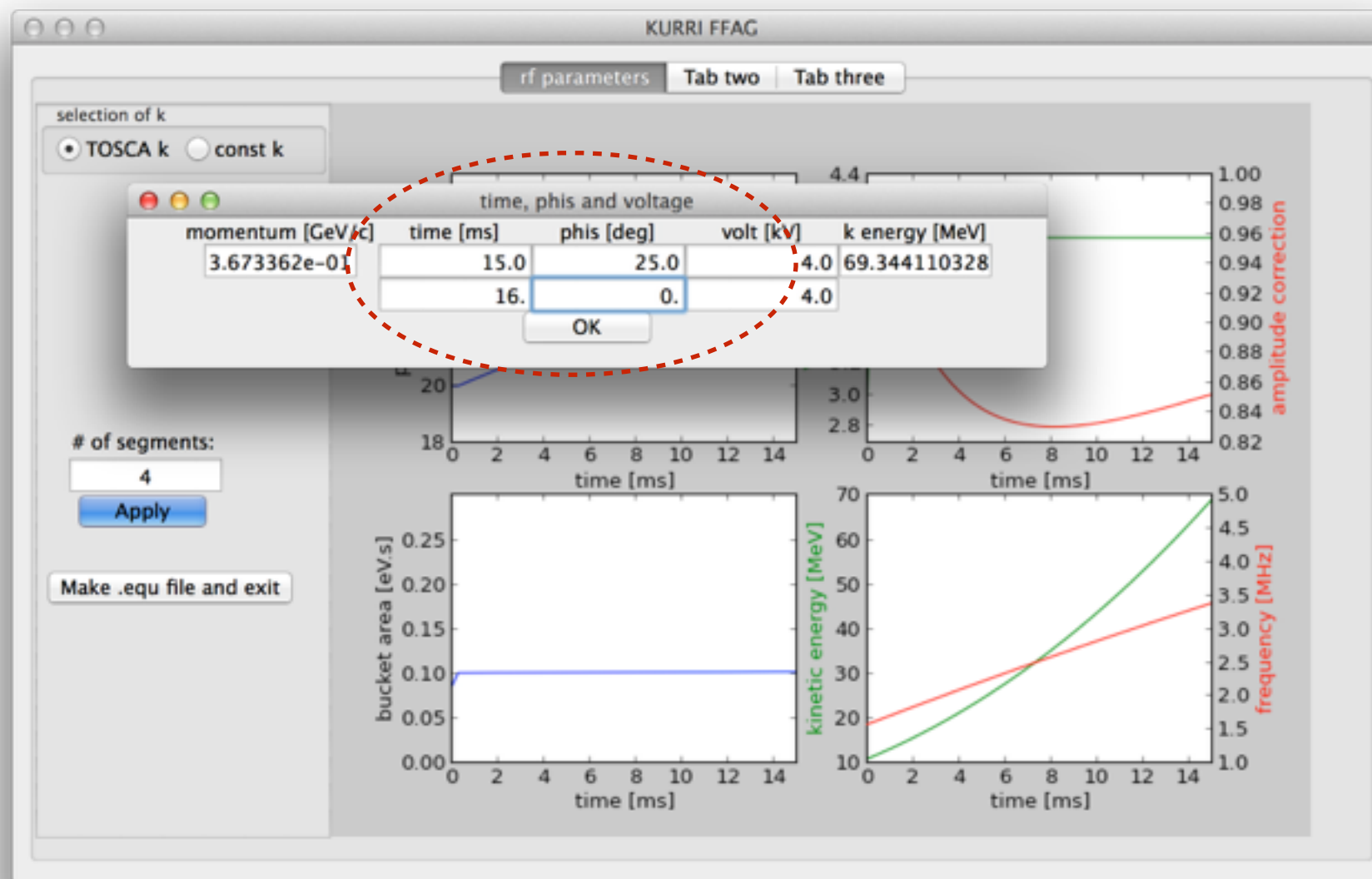
Set time from 0.25 to 15 ms, phis from 20 to 25 deg, voltage from 4 to 4 kV.



Example 3

add adiabatic capture 3

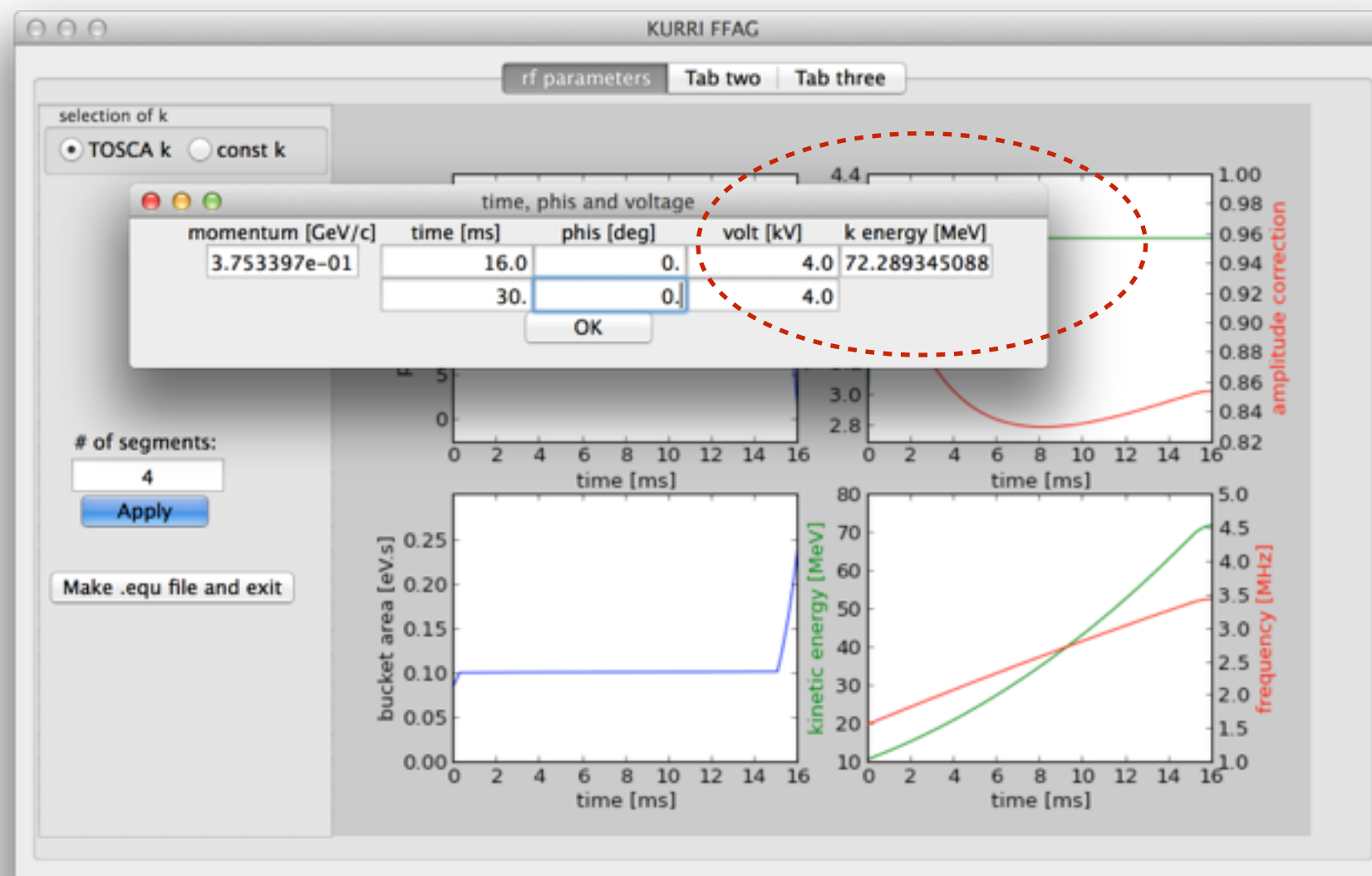
Set time from 15 to 16 ms, phis from 25 to 0 deg.



Example 3

add adiabatic capture 4

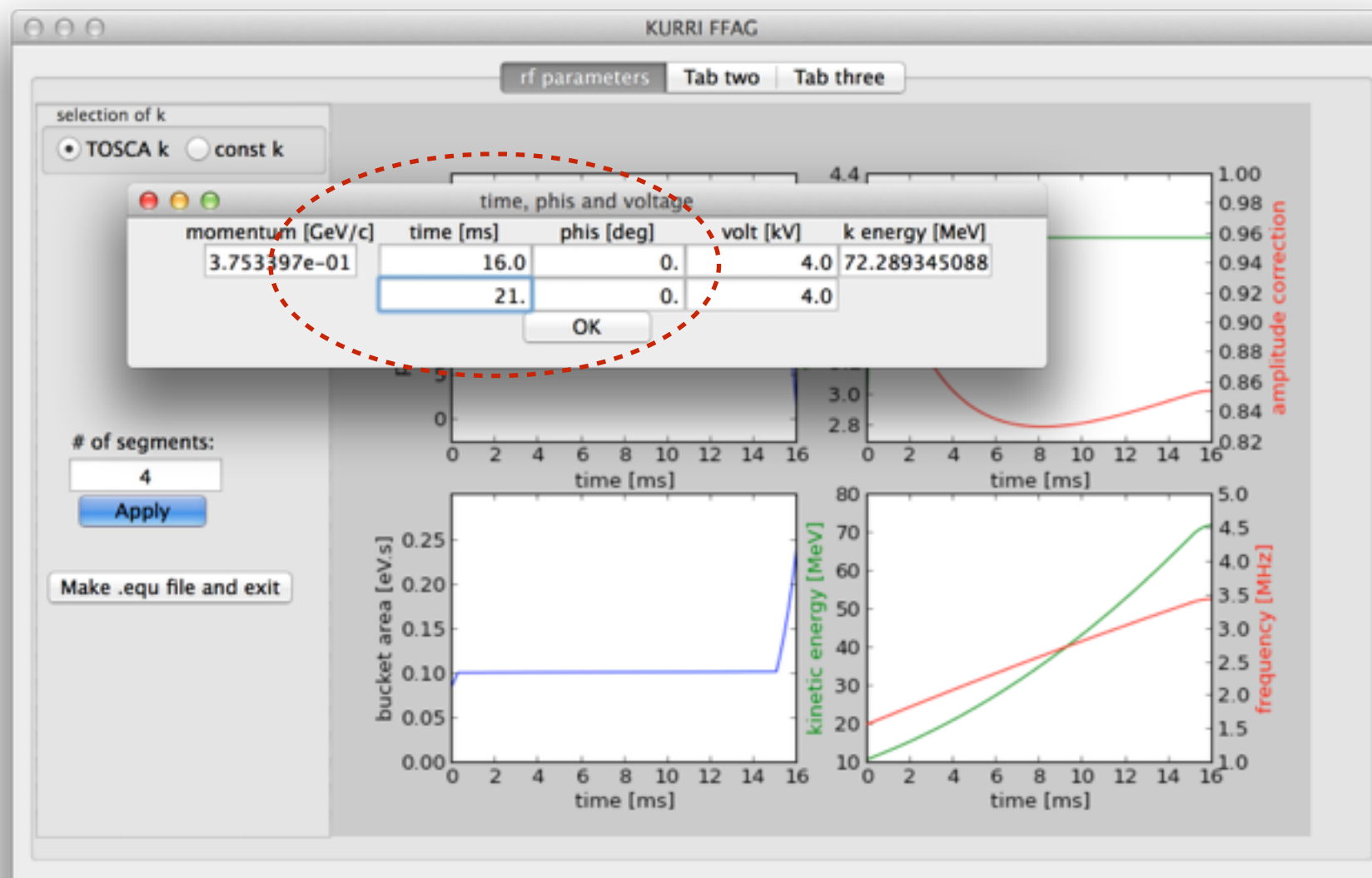
You will see energy is 72.3 MeV at flat top.



Example 3

add adiabatic capture 5

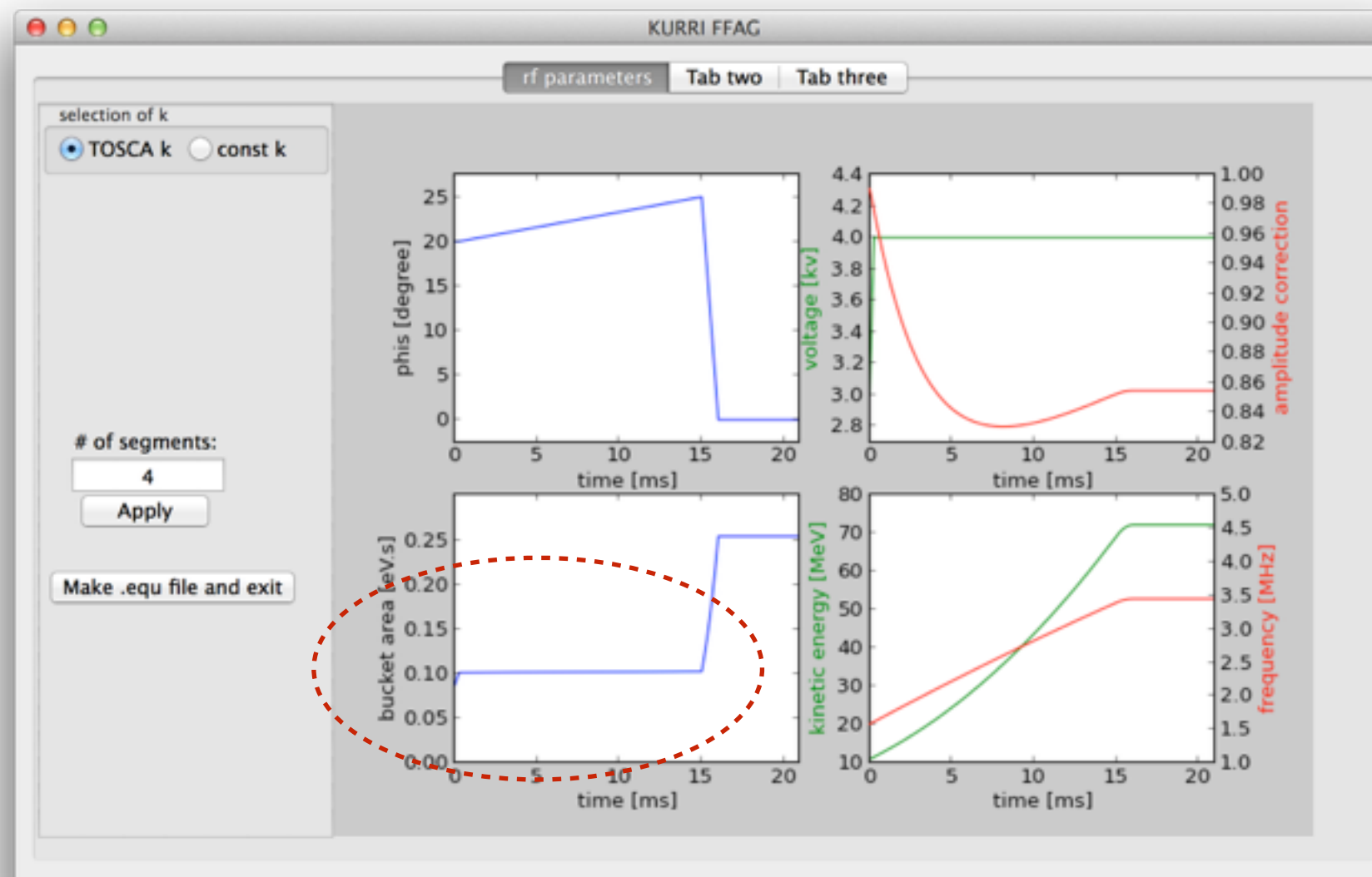
Set time from 16 to 21 ms.



Example 3

add adiabatic capture 6

With gradual increase (for the first 0.25 ms) and almost constant (for the following 15 ms) of bucket area will hopefully increase overall transmission.



Remarks

There is an option to choose TOSCA k or constant k.

Need experiment whether 1 ms for this transition is long enough or can be shortened.

Capture can be optimised with more segments.