

Linear konbs generation in madx

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Motivation

A matching job can be used for generating knob files (e.g. a crossing scheme).

The matching module can now write the knob files automatically. For the time being, the knob generation works only in the `USE_MACRO` mode, but it can be extended to the normal matching.

Example: Normal matching

```
use,sequence=lhcb1;
match,use_macro;
vary,name=kqf;
vary,name=kqd;
m1: macro={twiss;};
constraint,expr= table(summ,q1)=64.31;
constraint,expr= table(summ,q2)=59.32;
jacobian;
endmatch;

show,kqf,kqd;
kqf =      0.008990100753 ;
kqd =     -0.008600955656 ;
```

Example: Simple knob generation

```
match,use_macro;
vary,name=kqf,knob=dqp;
vary,name=kqd,knob=dqp;
m1: macro={twiss;};
constraint,expr= table(summ,q1)=64.31+1;
constraint,expr= table(summ,q2)=59.32+1;
jacobian;
endmatch,knobfile=knob.madx;
show,kqf,kqd;
  kqf =      0.009128525311 ;
  kqd =     -0.008739026185 ;
call,file=knob.madx;
show,kqf,kqd;
  kqf := +8.99010075e-03+1.38424558e-04*dqp ;
  kqd := -8.60095566e-03-1.38070529e-04*dqp ;
dqp=2; exec,m1;
value,table(summ,q1),table(summ,q2);
  table( summ q1 ) =      66.32661637 ;
  table( summ q2 ) =      61.32912496 ;
```

Example: Multivariate knob generation

```
match,use_macro;
vary,name=kqf;
vary,name=kqd;
m1: macro={twiss;};
constraint,name=dqx,expr= table(summ,q1)=64.31;
constraint,name=dqy,expr= table(summ,q2)=59.32;
jacobian,strategy=2,knobfile=knob.madx;
endmatch;
call,file=knob.madx;
show,kqf,kqd;
  kqf := +8.990101e-03+1.19875003e-04*dqx+1.98113154e-05*dqy ;
  kqd := -8.600956e-03-2.20214739e-05*dqx-1.17193160e-04*dqy ;
dqx=5; dqy=-3; exec,m1;
value,table(summ,q1),table(summ,q2);
  table( summ q1 ) =          69.29935715 ;
  table( summ q2 ) =          56.24733692 ;
```

Conclusion

The code is not in CVS yet.

An executable can be found in `rdemaria/dott/mad/madX/madx`
and an example in
`rdemaria/dott/mad/tests/match_testcases/job.knobs-tune.madx`.
Comments are welcome.