b\_f=0

**BIC**

**VM**

Den

* P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2

b\_m^2 - 2\*J\_m\*k\_f + D^2\*k\_f^2 - 2\*J\_m\*P\*k\_f + 2\*D\*b\_m\*k\_f

* J\_m^2

Num

b\_m\*k\_f^2 + P^2\*d\_d\*k\_f^2 + D\*k\_d\*k\_f^2 + P\*b\_m\*k\_f^2 + P\*d\_d\*k\_f^2 - P\*b\_m\*k\_d\*k\_f

D^2\*d\_d\*k\_f^2 + D\*J\_m\*k\_f^2 - D\*J\_m\*k\_d\*k\_f - J\_m\*P\*d\_d\*k\_f + D\*b\_m\*d\_d\*k\_f

0

**PS**

Num

b\_m\*k\_f^2 + D\*k\_d\*k\_f^2 + P\*b\_m\*k\_f^2 - P\*b\_m\*k\_d\*k\_f

D\*J\_m\*k\_f^2 - D\*J\_m\*k\_d\*k\_f

0

**Null**

Num

b\_m\*k\_f^2 + P\*b\_m\*k\_f^2

D\*J\_m\*k\_f^2

0

**BIC w/ filtered derivative**

**VM**

Num

B(:,1)

b\_m\*k\_f^2 + P^2\*d\_d\*k\_f^2 + D\*k\_d\*k\_f^2 + P\*b\_m\*k\_f^2 + P\*d\_d\*k\_f^2 - P\*b\_m\*k\_d\*k\_f

b\_m\*k\_f^2 + P^2\*d\_d\*k\_f^2 + P\*b\_m\*k\_f^2 + P\*d\_d\*k\_f^2 - P\*b\_m\*k\_d\*k\_f

-J\_m\*P\*d\_d\*k\_f

0

B(:,2)

0

D\*b\_m\*k\_f^2 + D\*d\_d\*k\_f^2 + 2\*D\*P\*d\_d\*k\_f^2 - D\*b\_m\*k\_d\*k\_f

-D\*J\_m\*d\_d\*k\_f

0

B(:,3)

0

D^2\*d\_d\*k\_f^2 + D\*J\_m\*k\_f^2 - D\*J\_m\*k\_d\*k\_f - J\_m\*P\*d\_d\*k\_f + D\*b\_m\*d\_d\*k\_f

J\_m^2\*b\_f

0

Den

B1(:,1)

P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2

P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2

- 2\*J\_m\*k\_f\*P + b\_m^2 - 2\*J\_m\*k\_f

J\_m^2

B1(:,2)

0

2\*D\*k\_f^2 + 2\*D\*P\*k\_f^2

- 2\*D\*J\_m\*k\_f

0

B1(:,3)

0

b\_m^2 - 2\*J\_m\*k\_f + D^2\*k\_f^2 - 2\*J\_m\*P\*k\_f + 2\*D\*b\_m\*k\_f

J\_m^2

**PS**

Num

B(:,1)

b\_m\*k\_f^2 + D\*k\_d\*k\_f^2 + P\*b\_m\*k\_f^2 - P\*b\_m\*k\_d\*k\_f

b\_m\*k\_f^2 + P\*b\_m\*k\_f^2 - P\*b\_m\*k\_d\*k\_f

0

0

B(:,2)

0

D\*b\_m\*k\_f^2 - D\*b\_m\*k\_d\*k\_f

0

0

B(:,3)

0

D\*J\_m\*k\_f^2 - D\*J\_m\*k\_d\*k\_f

0

0

Den

B1(:,1)

P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2

P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2

b\_m^2 - 2\*J\_m\*k\_f - 2\*J\_m\*P\*k\_f

J\_m^2

B1(:,2)

0

2\*D\*k\_f^2 + 2\*D\*P\*k\_f^2

-2\*D\*J\_m\*k\_f

0

B1(:,3)

0

b\_m^2 - 2\*J\_m\*k\_f + D^2\*k\_f^2 - 2\*J\_m\*P\*k\_f + 2\*D\*b\_m\*k\_f

J\_m^2

0

**Null**

Num

B(:,1)

b\_m\*k\_f^2 + P\*b\_m\*k\_f^2

b\_m\*k\_f^2 + P\*b\_m\*k\_f^2

0

0

B(:,2)

* 0
* D\*b\_m\*k\_f^2
* 0
* 0

B(:,3)

0

D\*J\_m\*k\_f^2

0

0

Den

B1(:,1)

* P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2
* P^2\*k\_f^2 + 2\*P\*k\_f^2 + k\_f^2
* P^2\*b\_f^2 + 2\*P\*b\_f^2 + 2\*P\*b\_f\*b\_m - 2\*J\_m\*k\_f\*P + b\_f^2 + 2\*b\_f\*b\_m + b\_m^2 - 2\*J\_m\*k\_f
* J\_m^2

B1(:,2)

* 0
* 2\*D\*k\_f^2 + 2\*D\*P\*k\_f^2
* 2\*D\*b\_f^2 - 2\*D\*J\_m\*k\_f + 2\*D\*b\_f\*b\_m + 2\*D\*P\*b\_f^2
* 0

B1(:,3)

* 0
* D^2\*k\_f^2 + 2\*D\*b\_m\*k\_f + P^2\*b\_f^2 + 2\*P\*b\_f^2 + 2\*P\*b\_f\*b\_m - 2\*J\_m\*P\*k\_f + b\_f^2 + 2\*b\_f\*b\_m + b\_m^2 - 2\*J\_m\*k\_f
* D^2\*b\_f^2 + 2\*D\*J\_m\*b\_f + J\_m^2
* 0

envnum =

(kf + bf\*x)\*((kd + dd\*x)\*(P\*t + x\*(P + D\*t)) + (Jm\*x^2 + bm\*x)\*(t + x) - bf\*x\*(t + x + P\*t + x\*(P + D\*t)))

envden =

x\*((kf + bf\*x)\*(t + x + P\*t + x\*(P + D\*t)) + (Jm\*x^2 + bm\*x)\*(t + x))

envnum =

(kf + bf\*x)\*((kd + dd\*x)\*(P + D\*x) + bm\*x + Jm\*x^2 - bf\*x\*(P + D\*x + 1))

envden =

x\*((kf + bf\*x)\*(P + D\*x + 1) + bm\*x + Jm\*x^2)