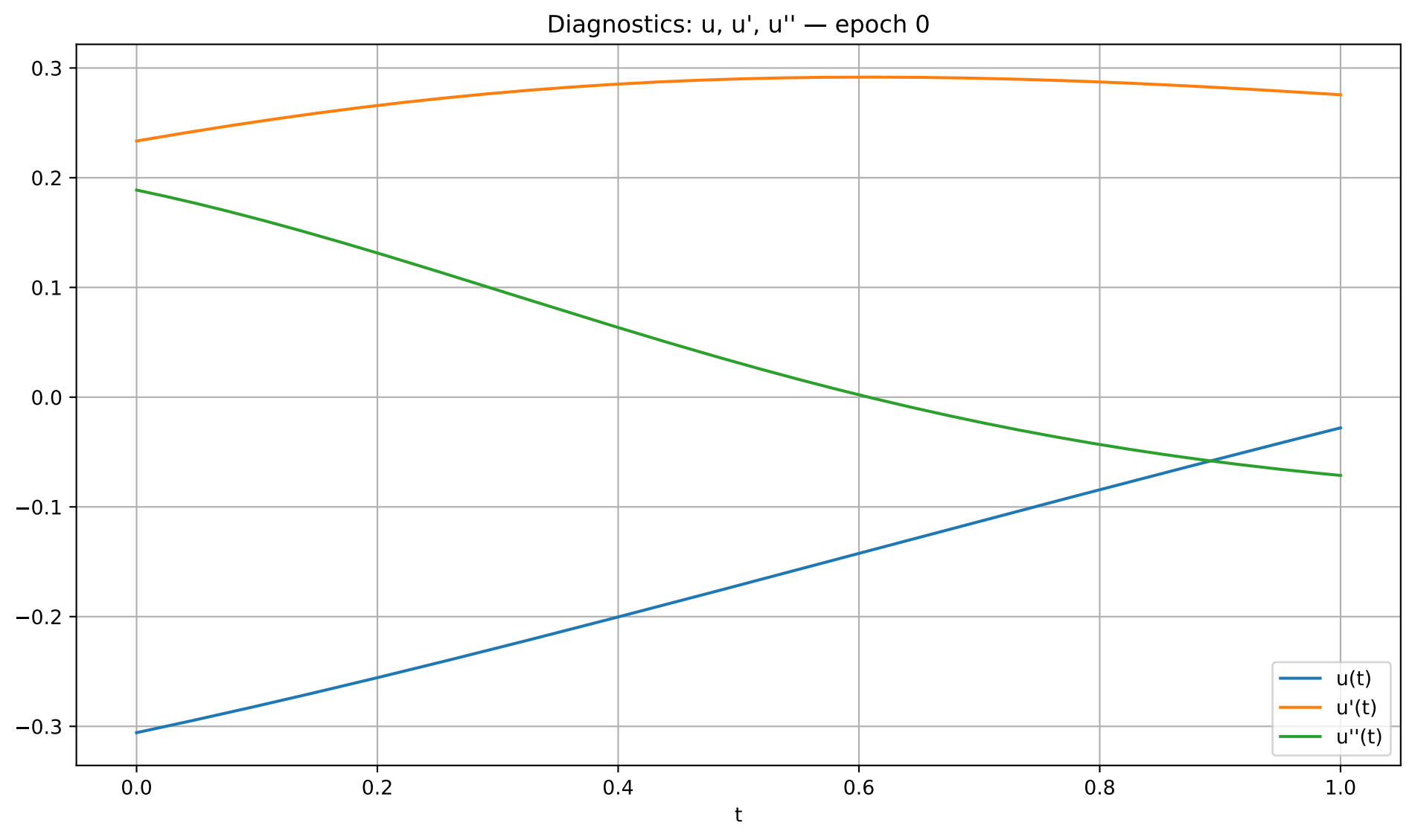
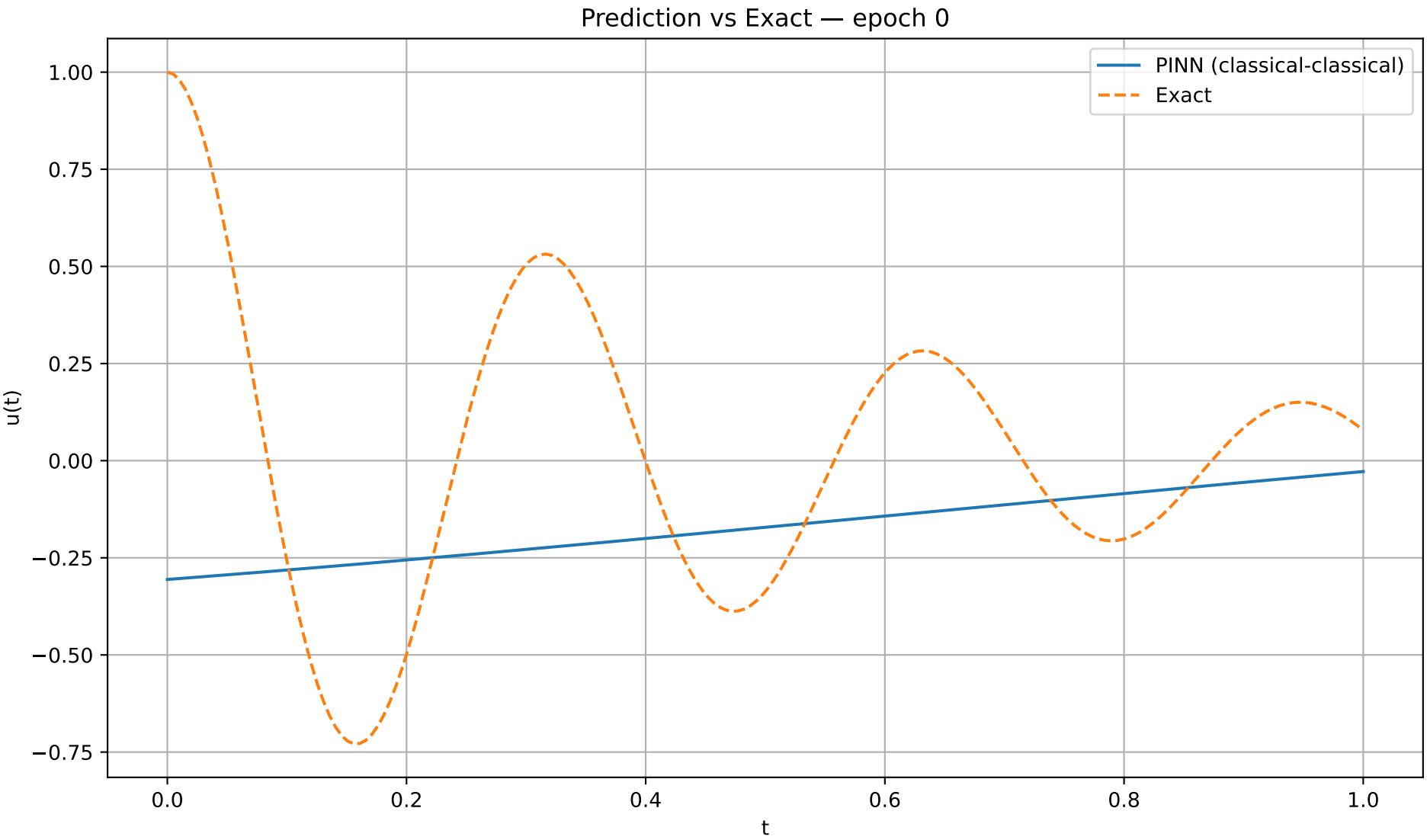
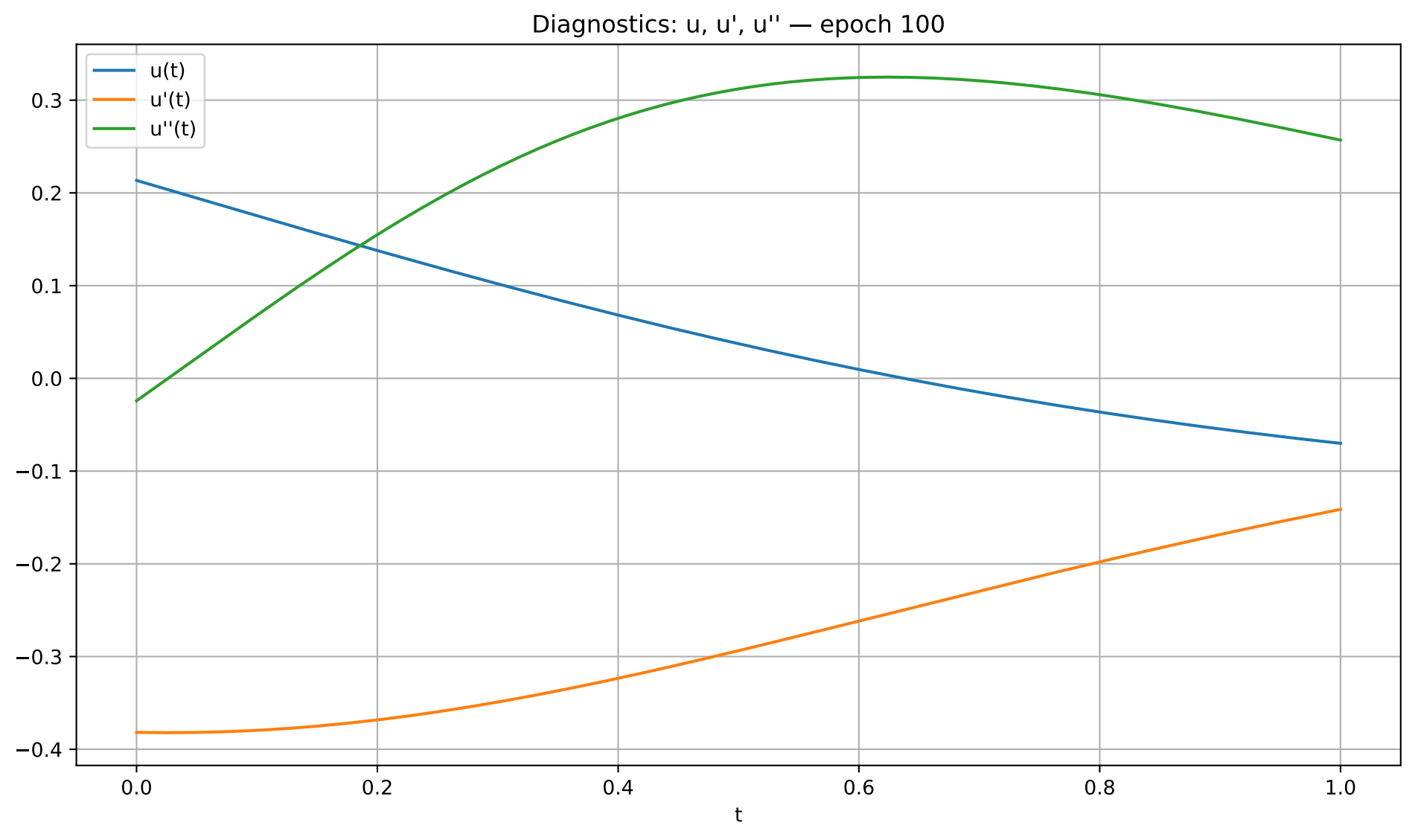
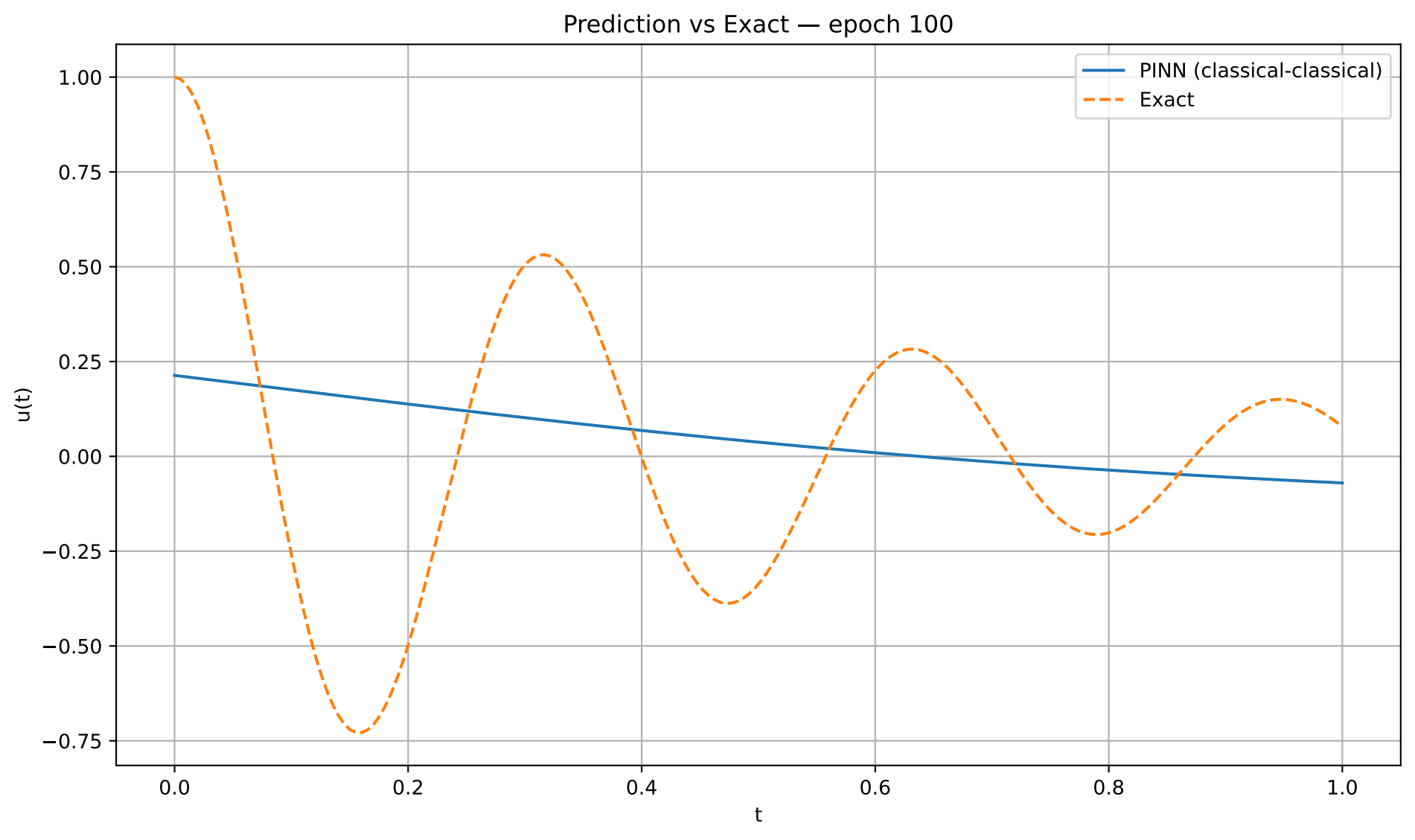
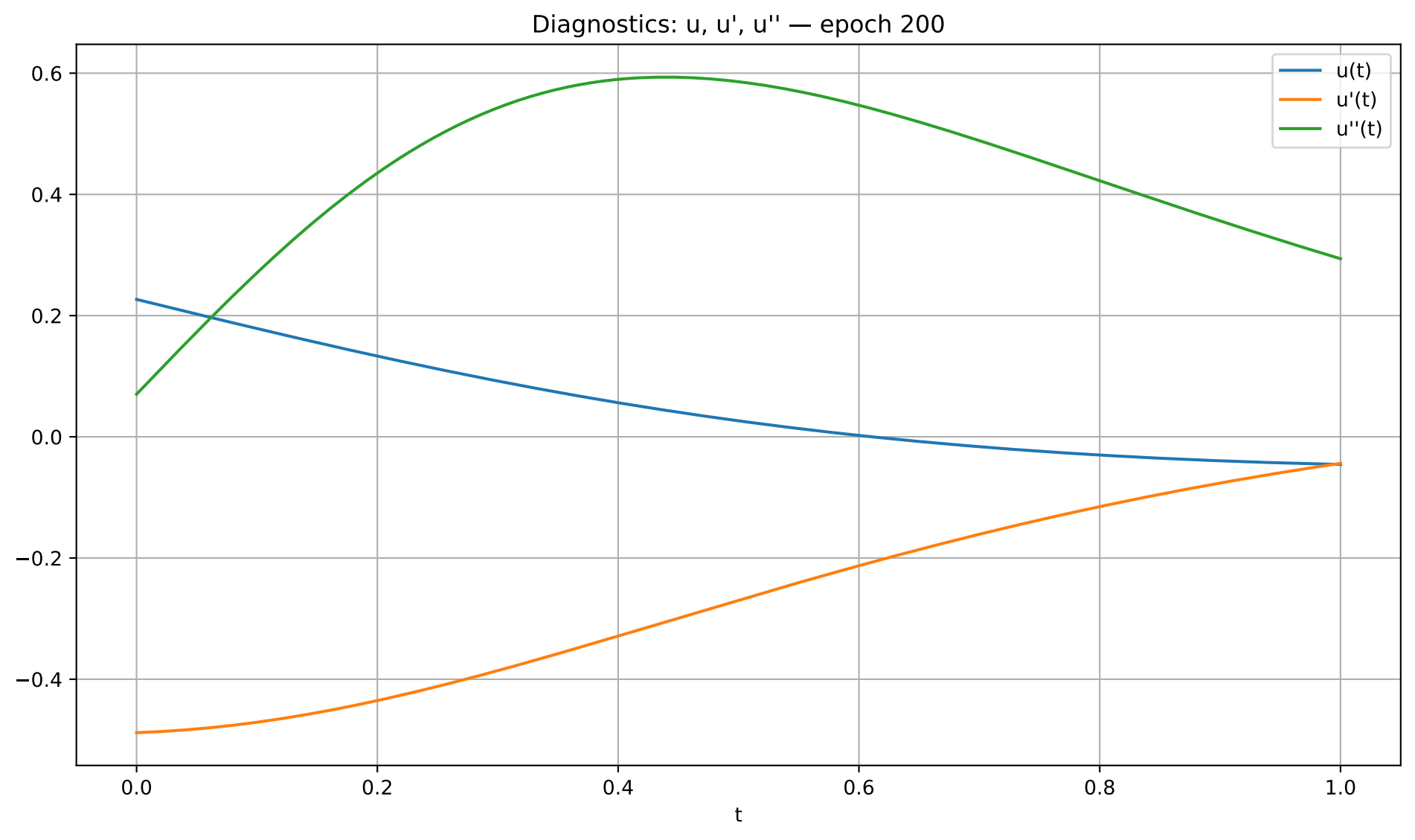
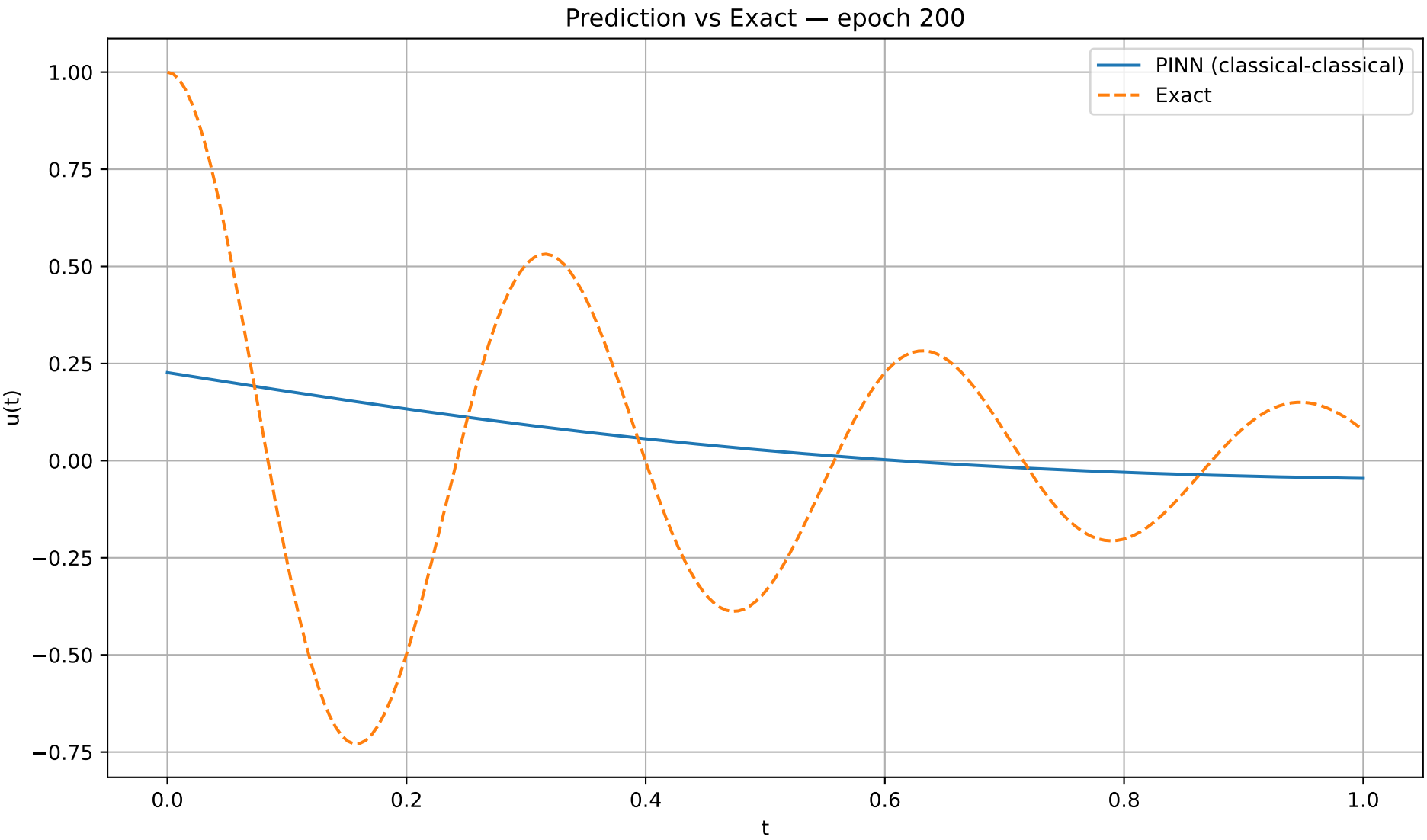

Diagnostics: u, u', u'' — epoch 0
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
0.0
0.2
0.4
0.6
0.8
1.0
t
u(t)
u'(t)
u''(t)

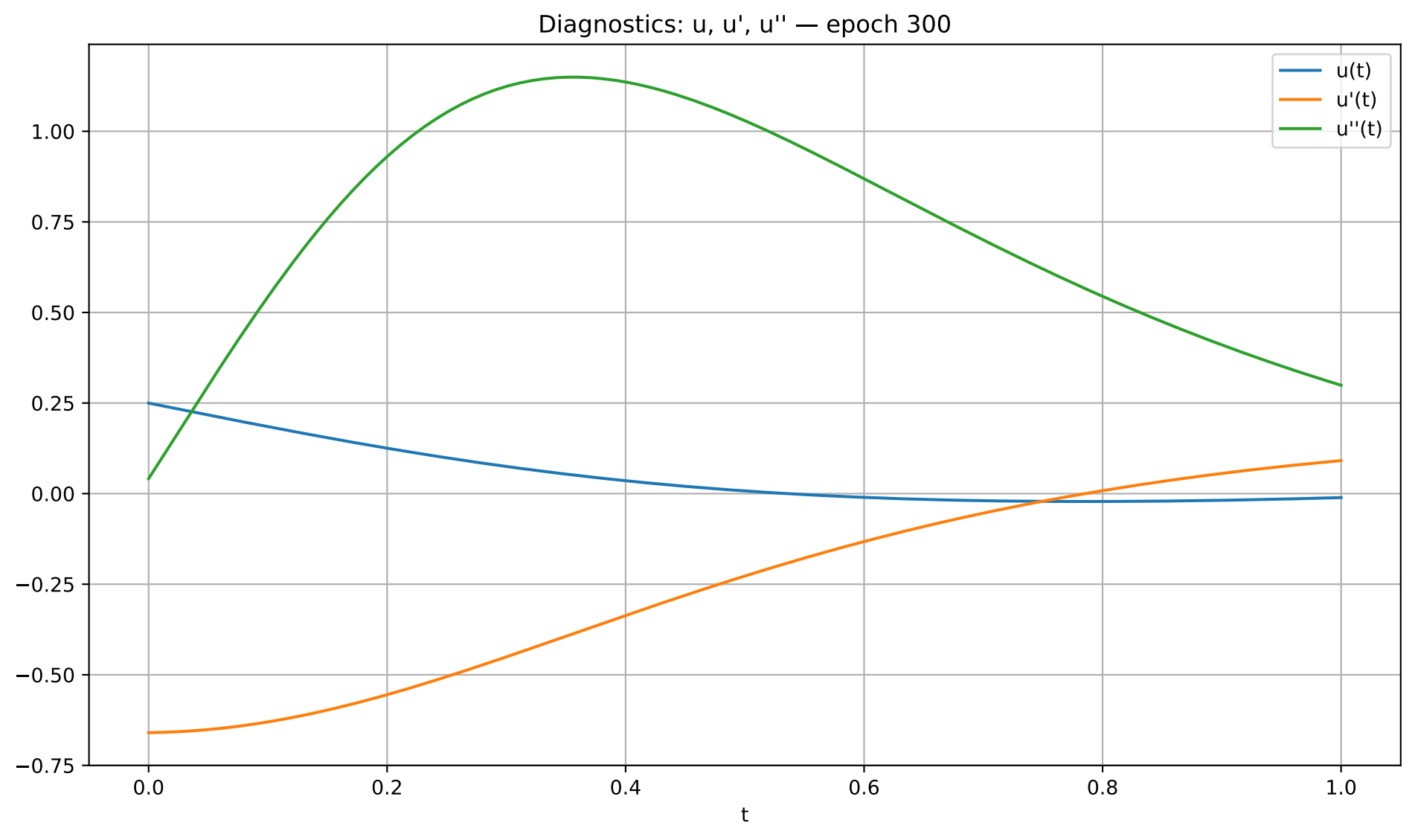

Prediction vs Exact — epoch 0
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

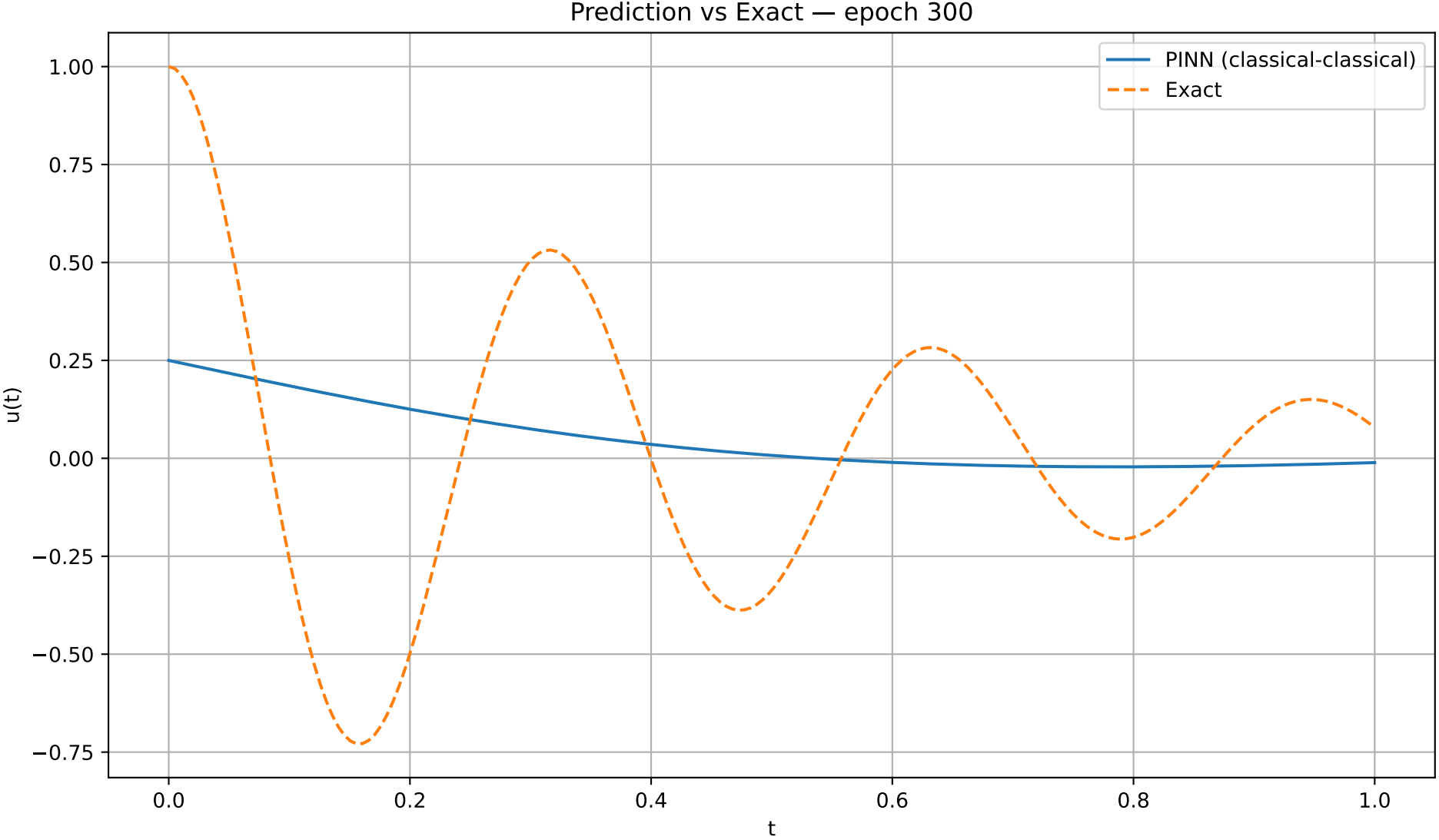

Diagnostics: u, u', u'' — epoch 100
u(t)
u'(t)
u''(t)
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
−0.4
0.0
0.2
0.4
0.6
0.8
1.0
t

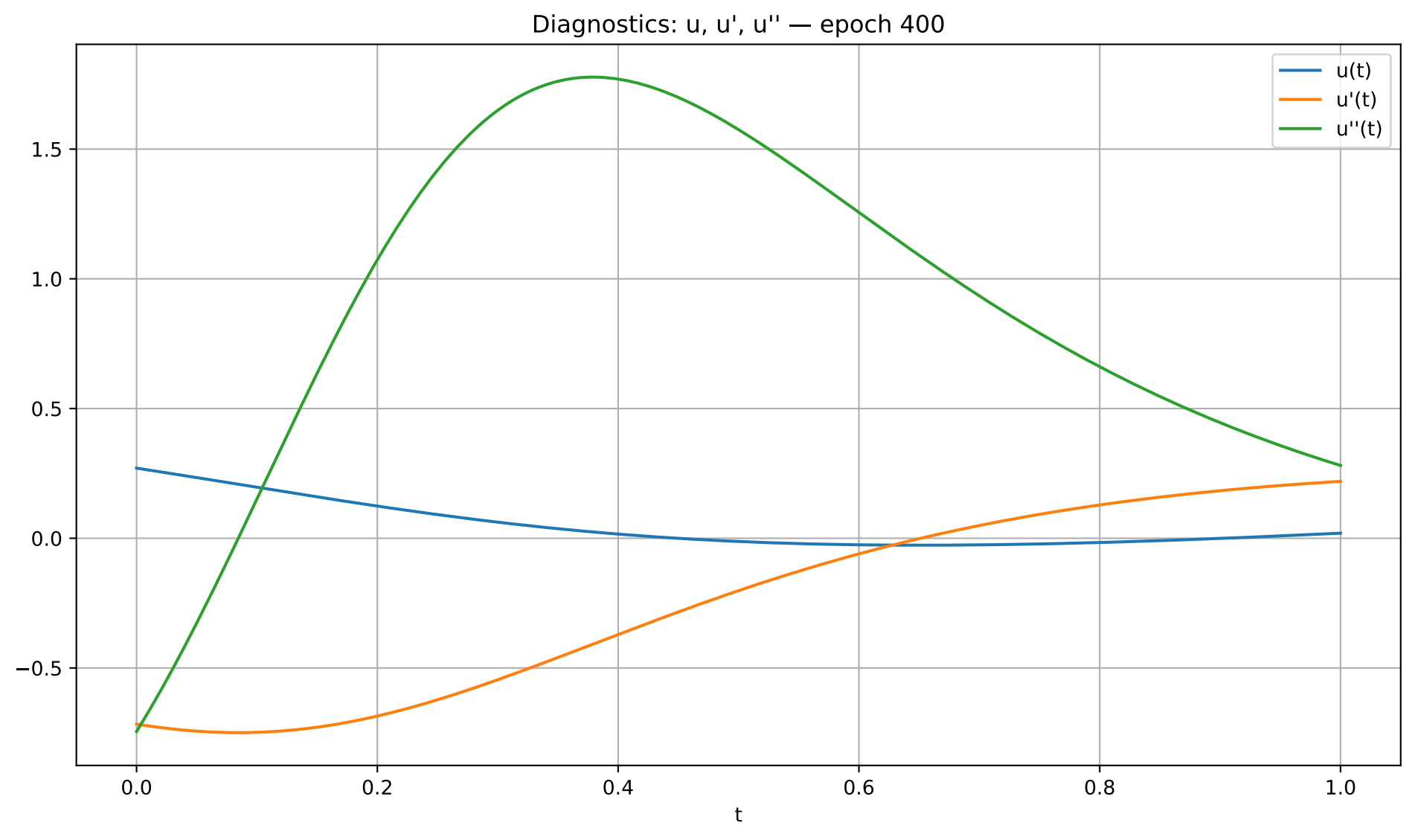

Prediction vs Exact — epoch 100
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

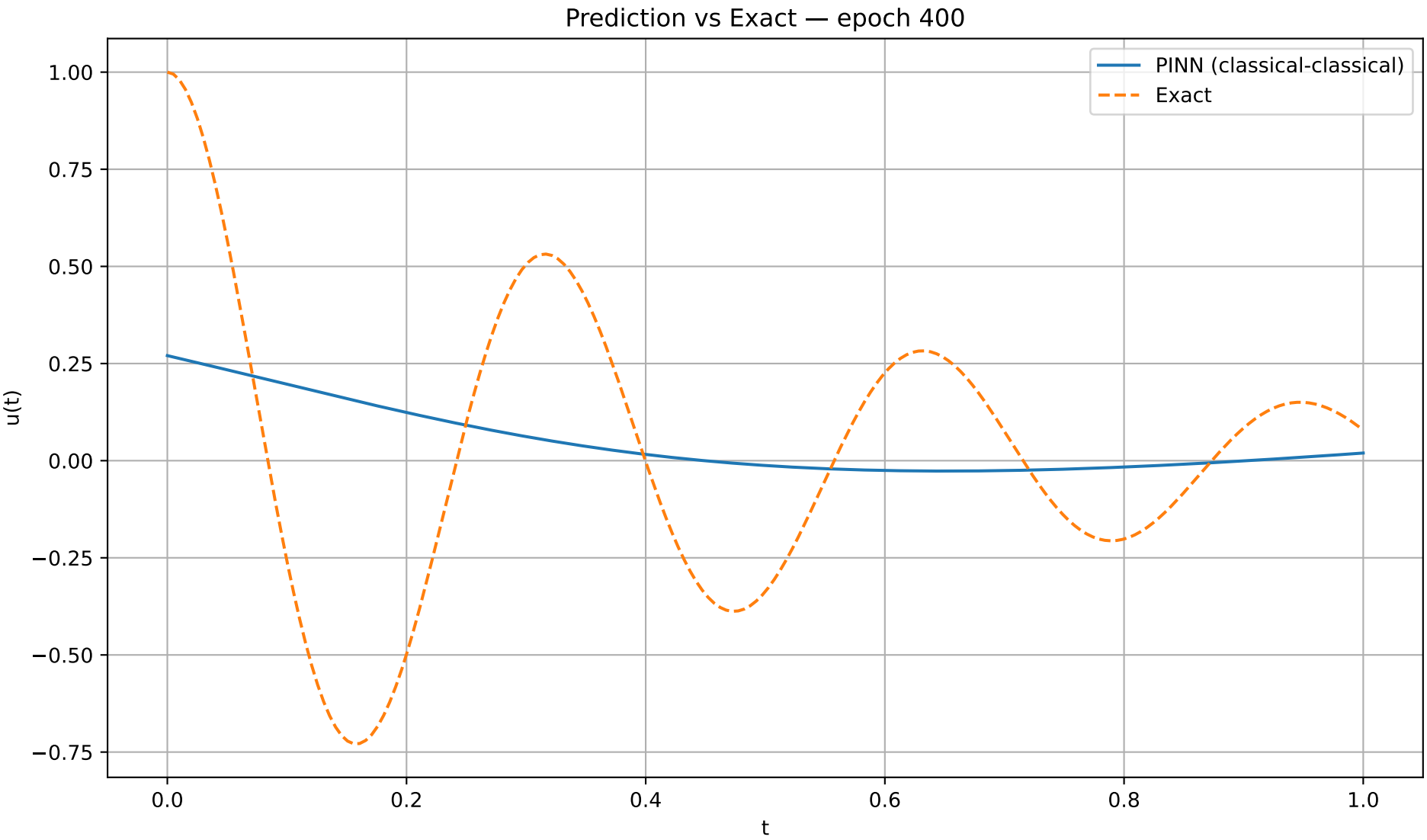

Diagnostics: u, u', u'' — epoch 200
u(t)
u'(t)
u''(t)
0.6
0.4
0.2
0.0
−0.2
−0.4
0.0
0.2
0.4
0.6
0.8
1.0
t

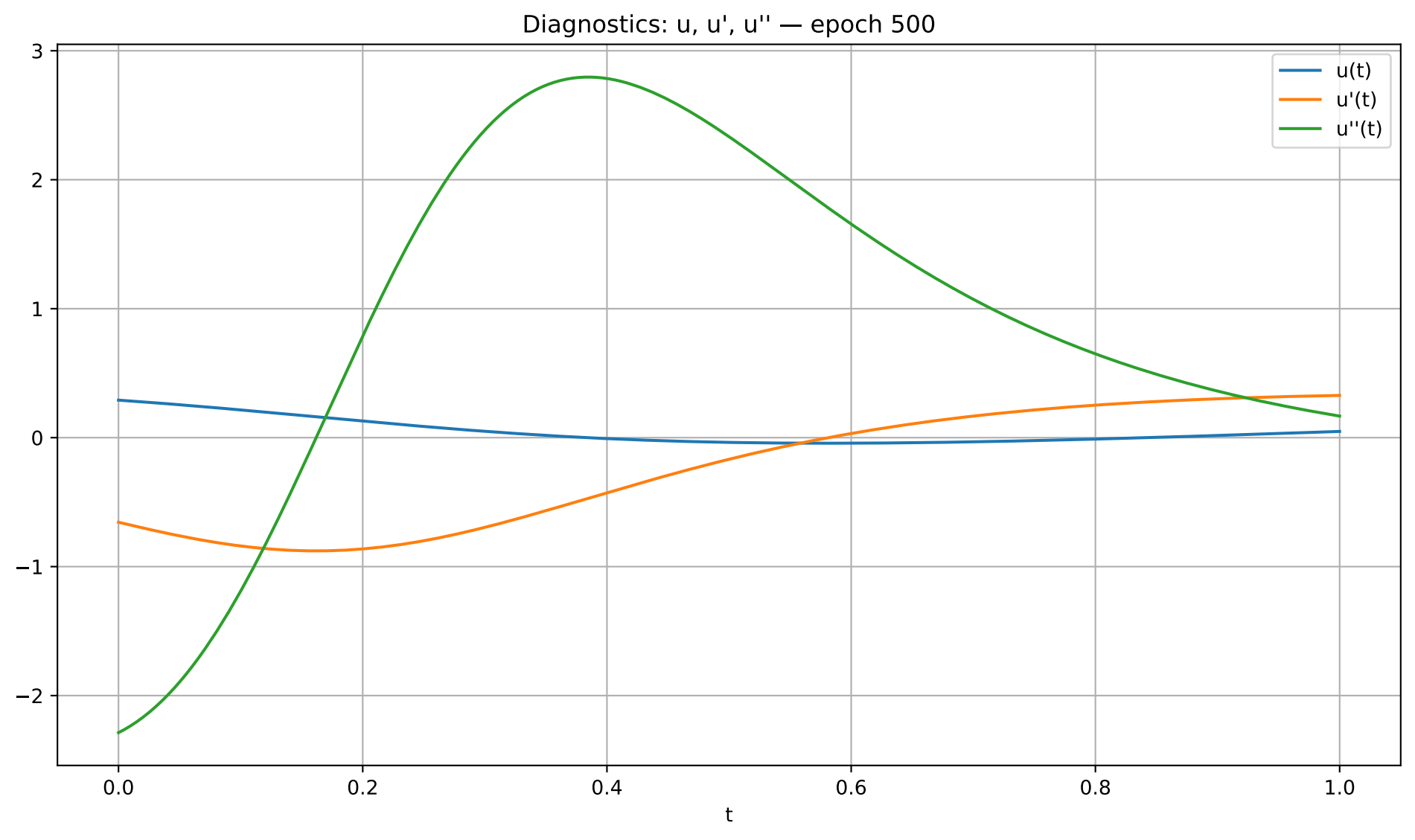

Prediction vs Exact — epoch 200
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

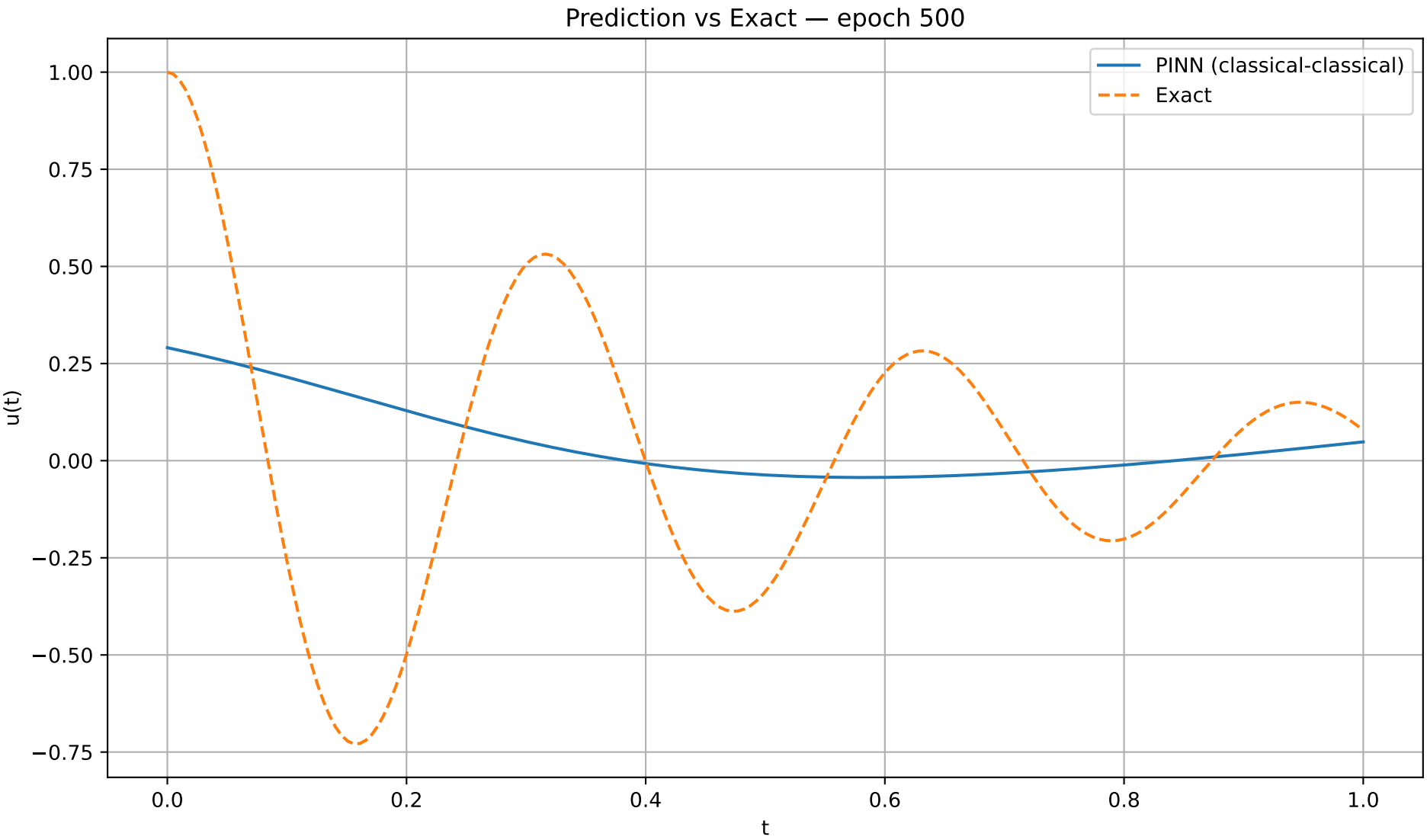

Diagnostics: u, u', u'' — epoch 300
u(t)
u'(t)
u''(t)
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0
t

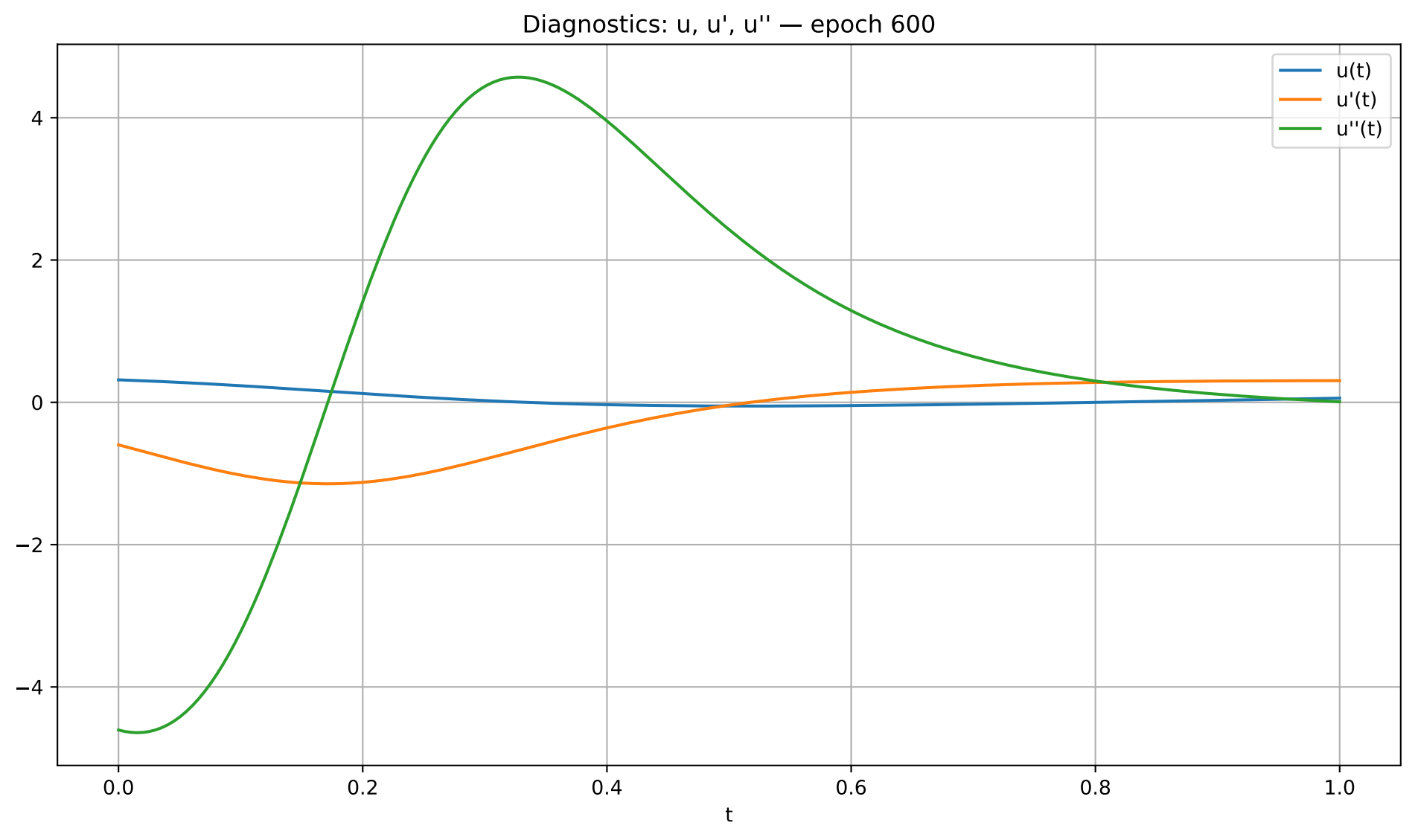

Prediction vs Exact — epoch 300
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

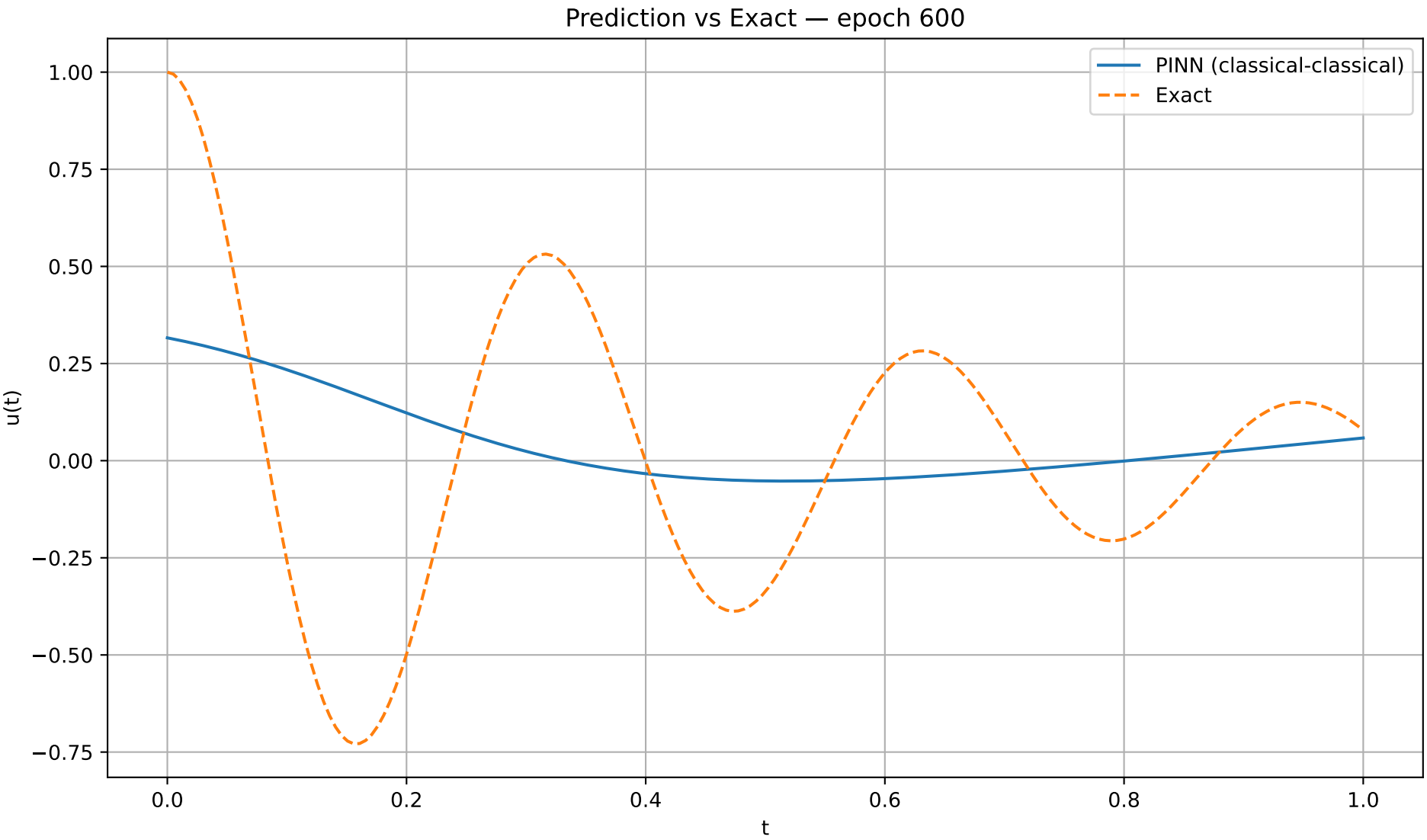

Diagnostics: u, u', u'' — epoch 400
u(t)
u'(t)
u''(t)
1.5
1.0
0.5
0.0
−0.5
0.0
0.2
0.4
0.6
0.8
1.0
t

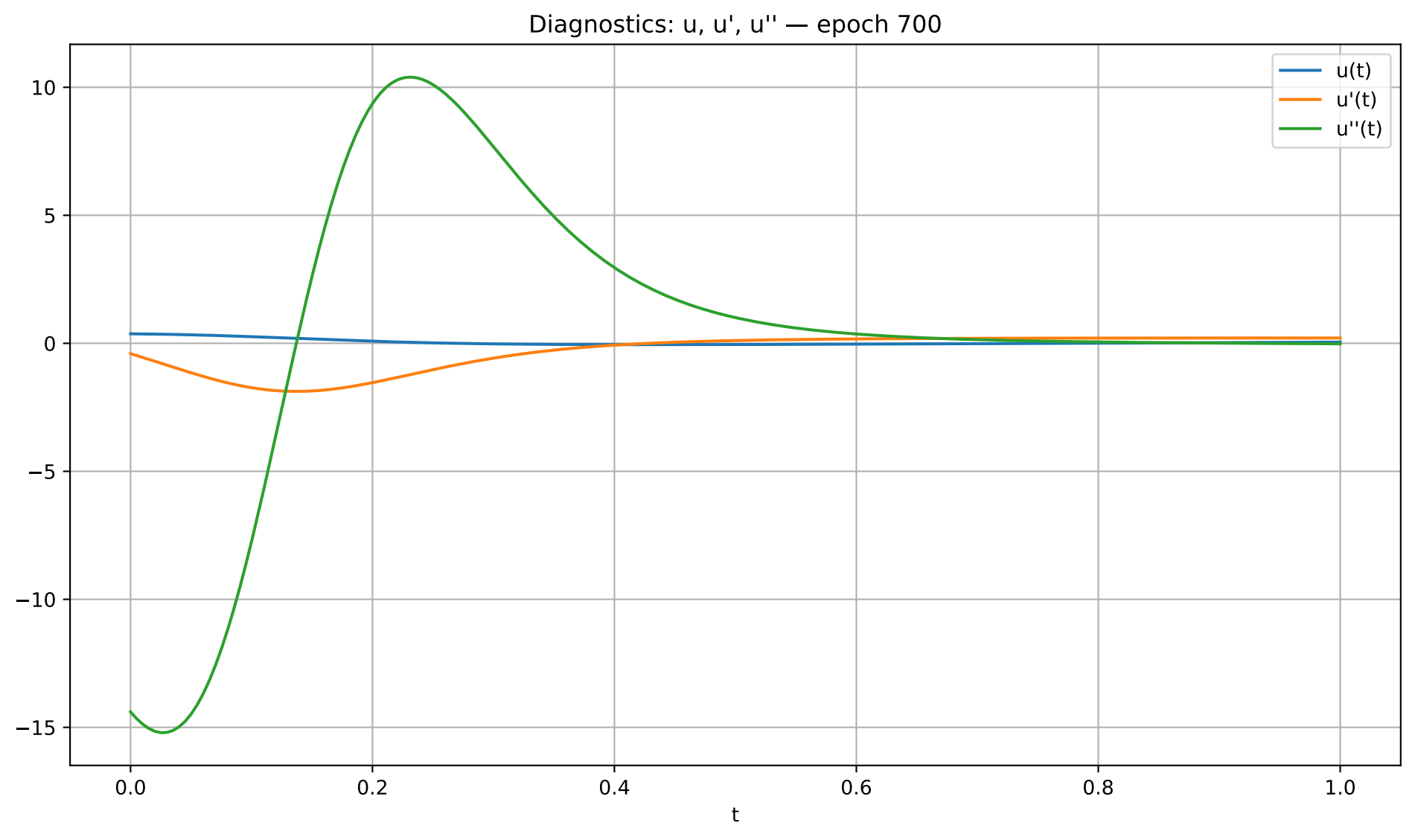

Prediction vs Exact — epoch 400
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

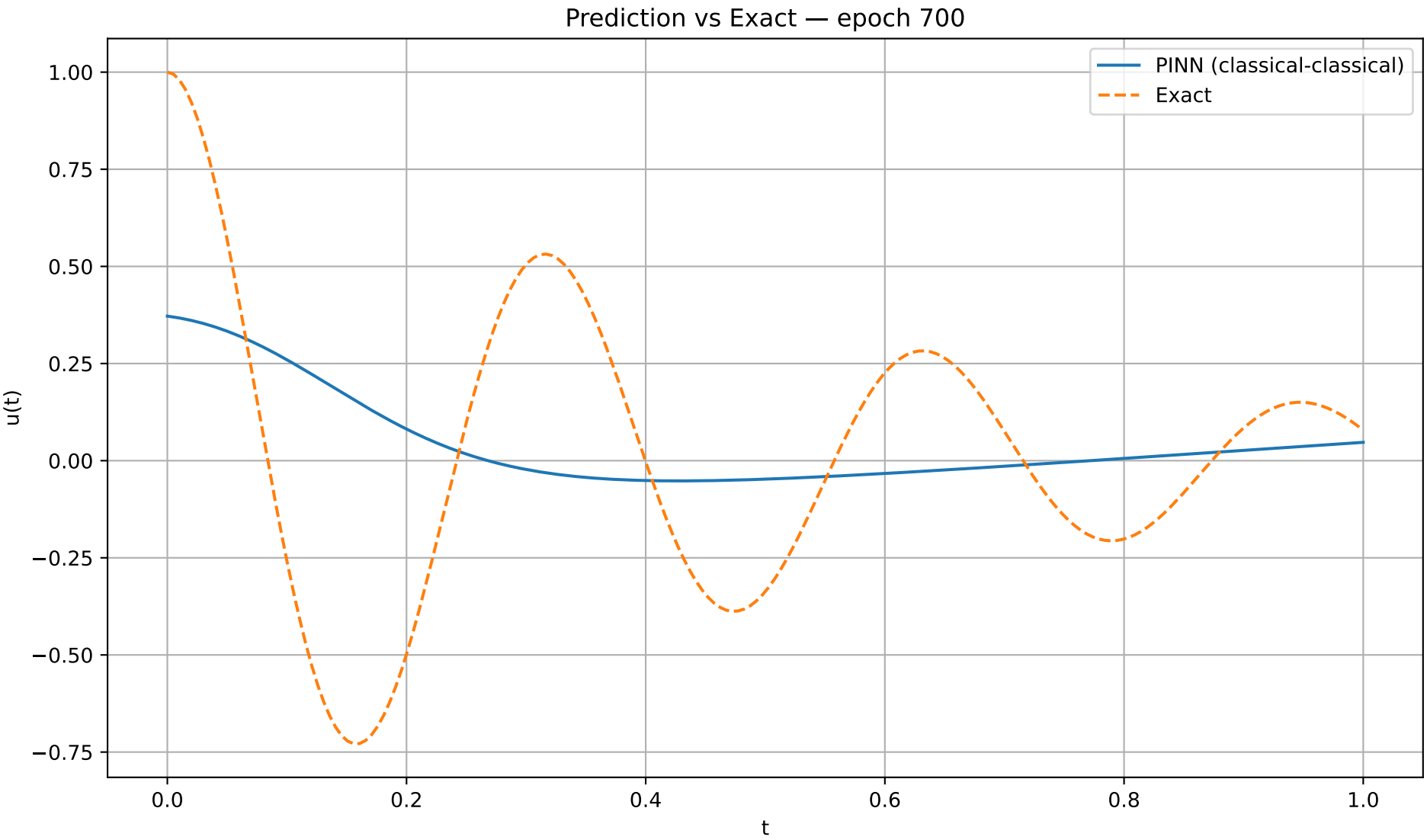

Diagnostics: u, u', u'' — epoch 500
u(t)
u'(t)
u''(t)
3
2
1
0
−1
−2
0.0
0.2
0.4
0.6
0.8
1.0
t

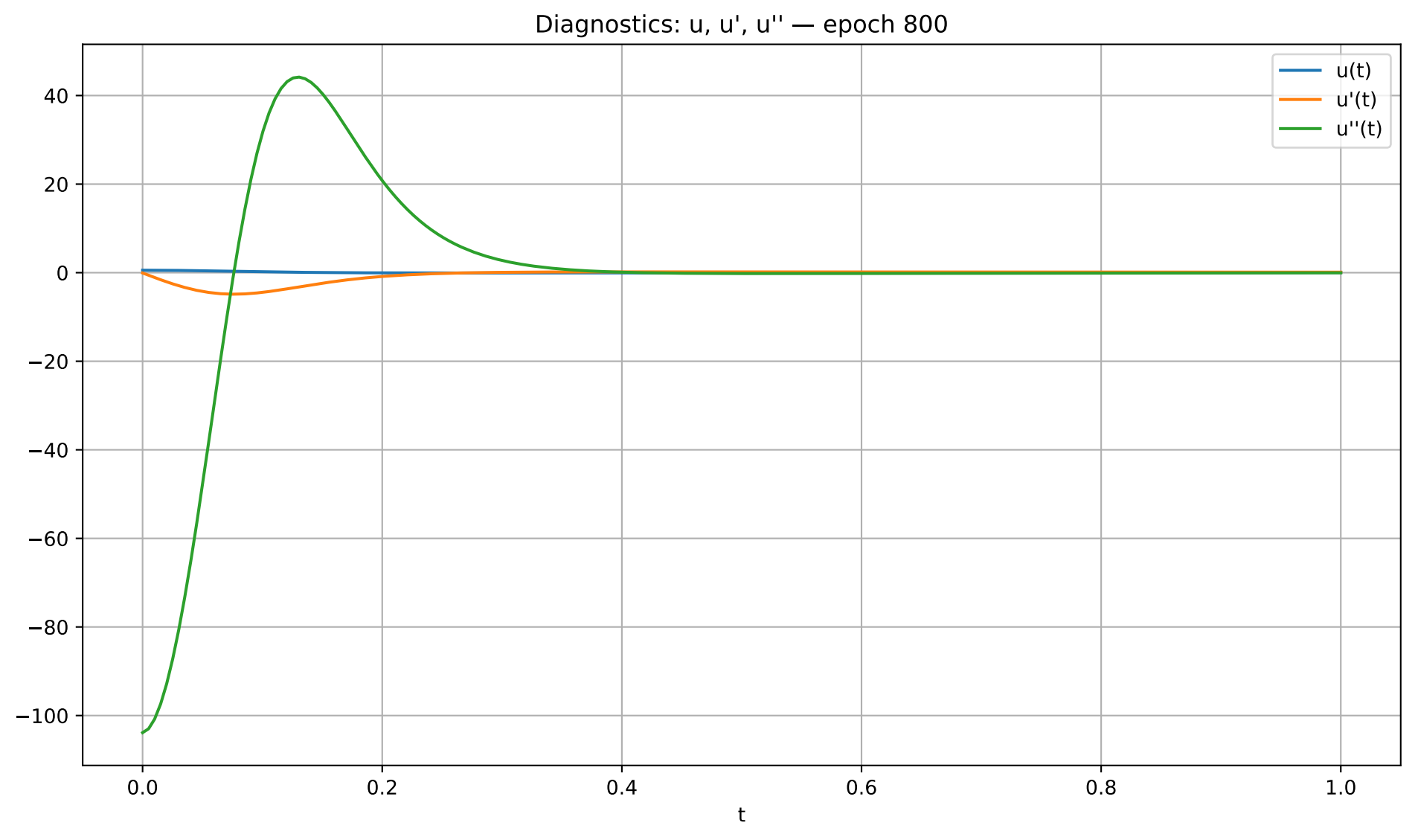

Prediction vs Exact — epoch 500
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

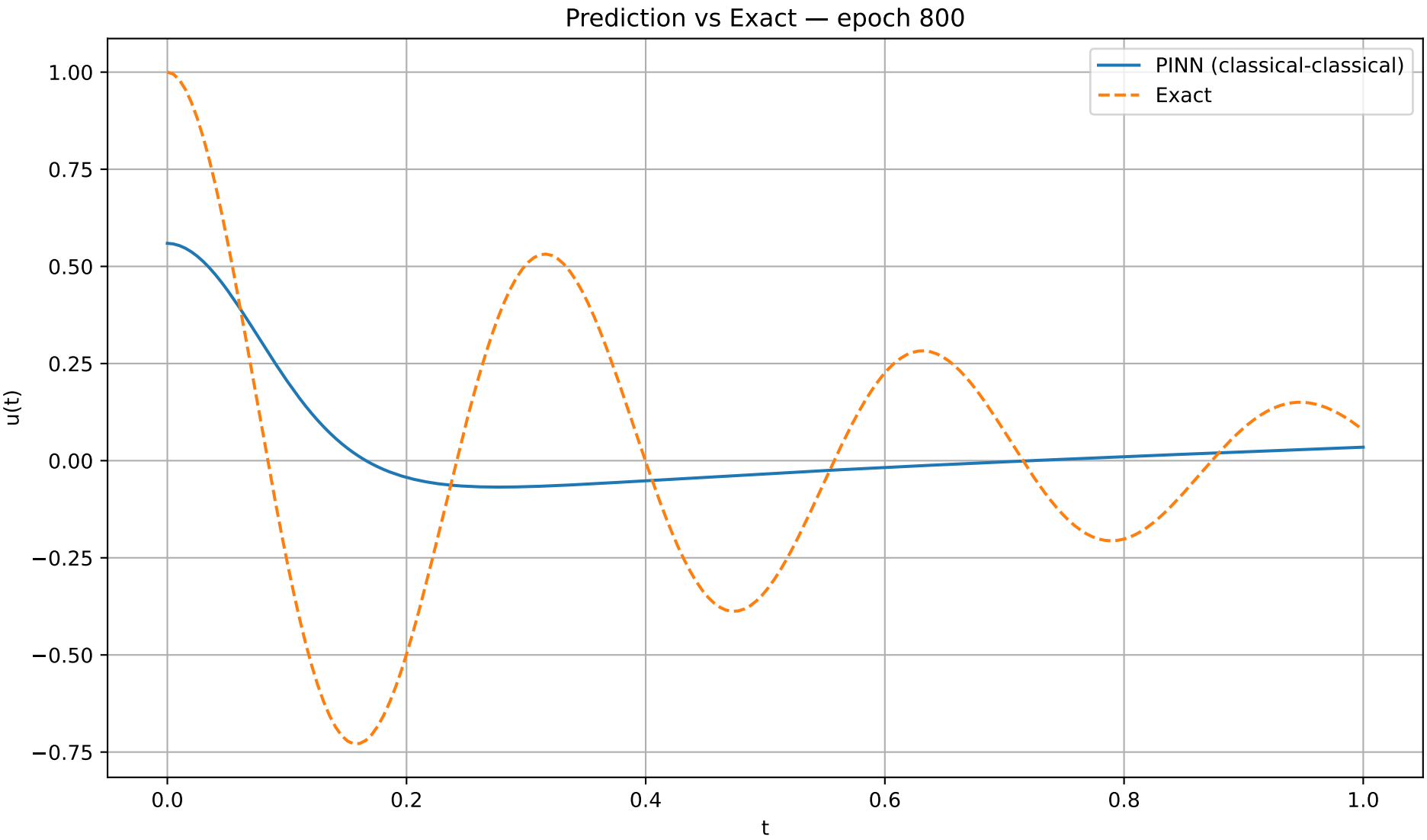

Diagnostics: u, u', u'' — epoch 600
u(t)
u'(t)
u''(t)
4
2
0
−2
−4
0.0
0.2
0.4
0.6
0.8
1.0
t

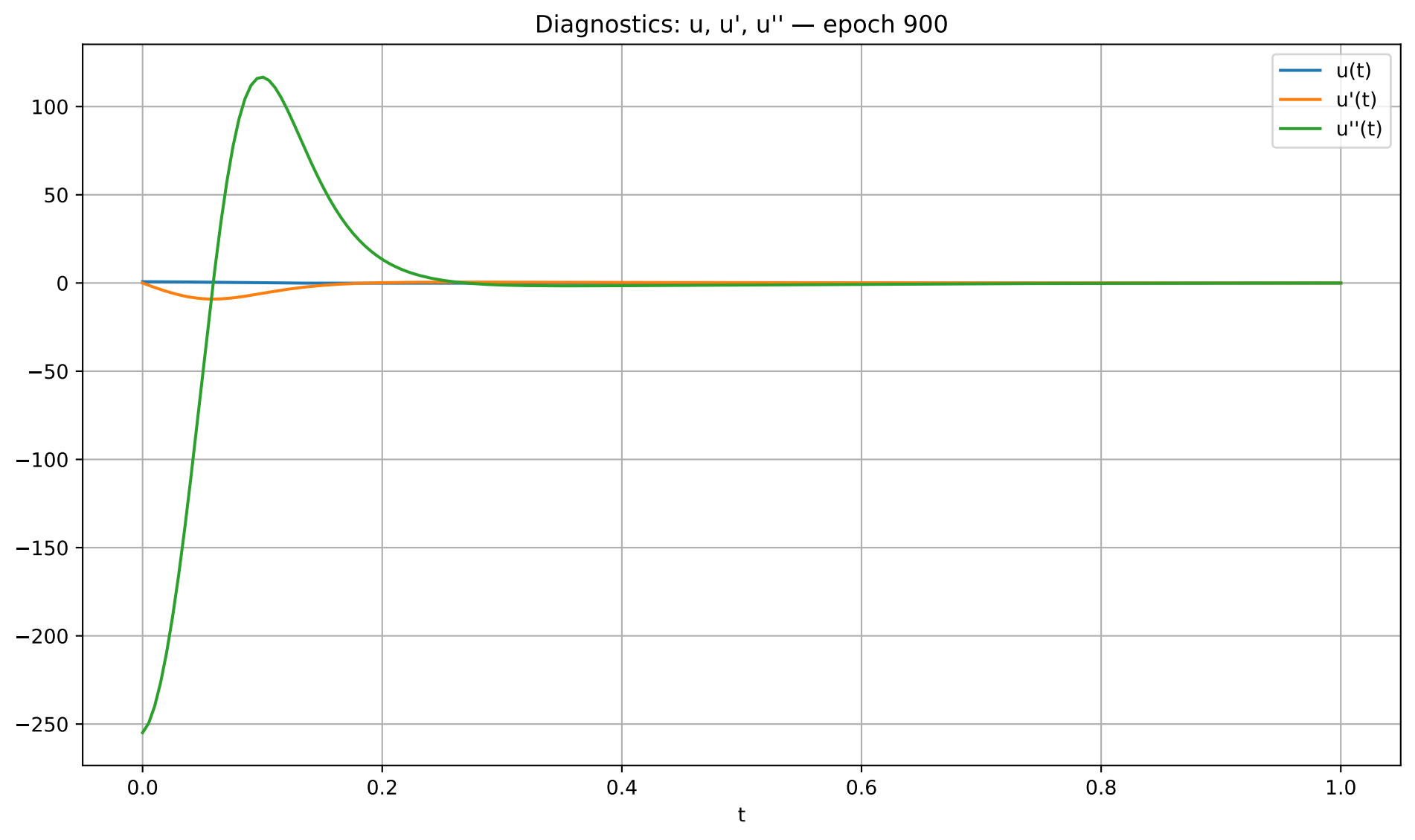

Prediction vs Exact — epoch 600
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

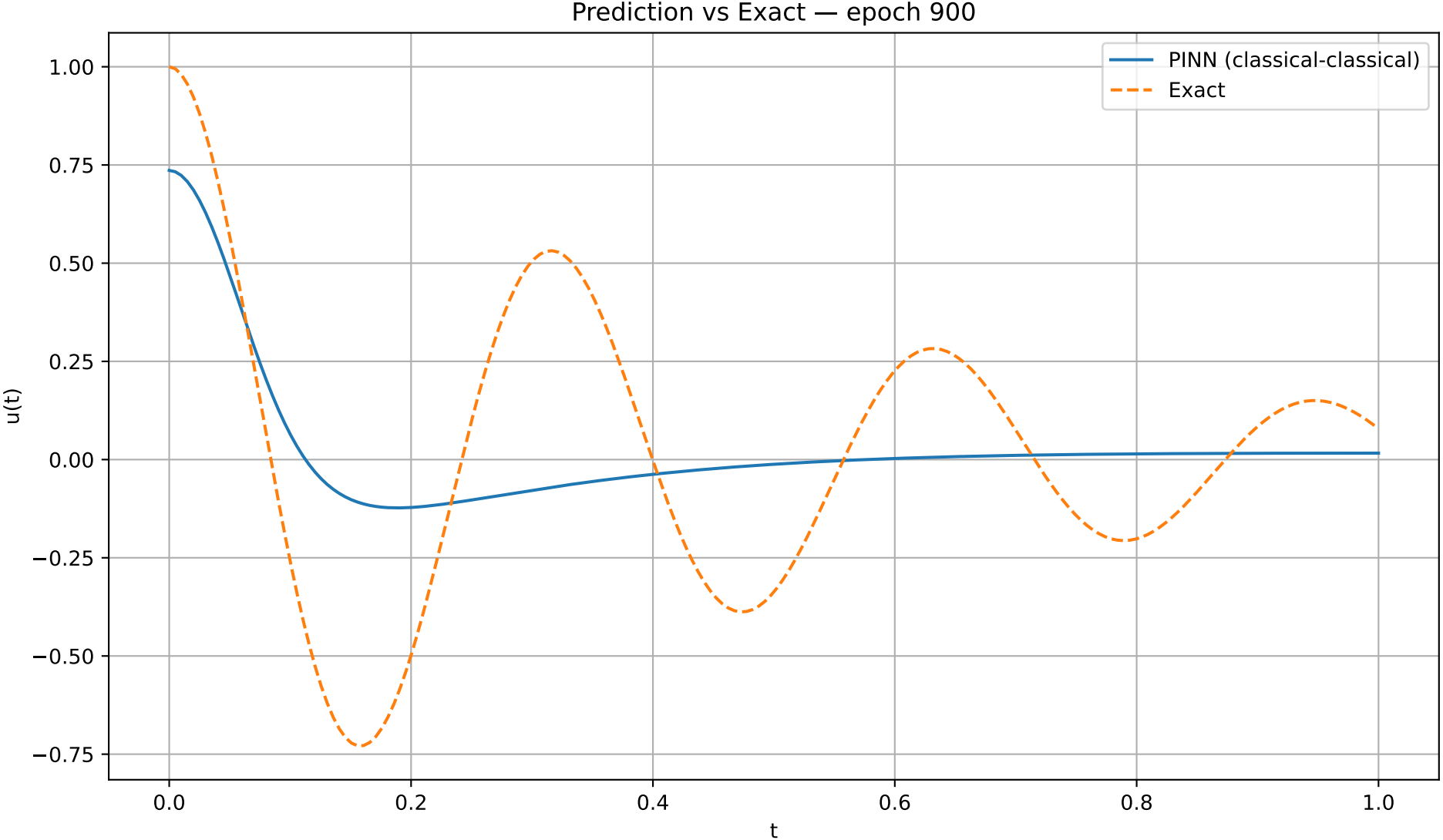

Diagnostics: u, u', u'' — epoch 700
u(t)
u'(t)
u''(t)
10
5
0
−5
−10
−15
0.0
0.2
0.4
0.6
0.8
1.0
t

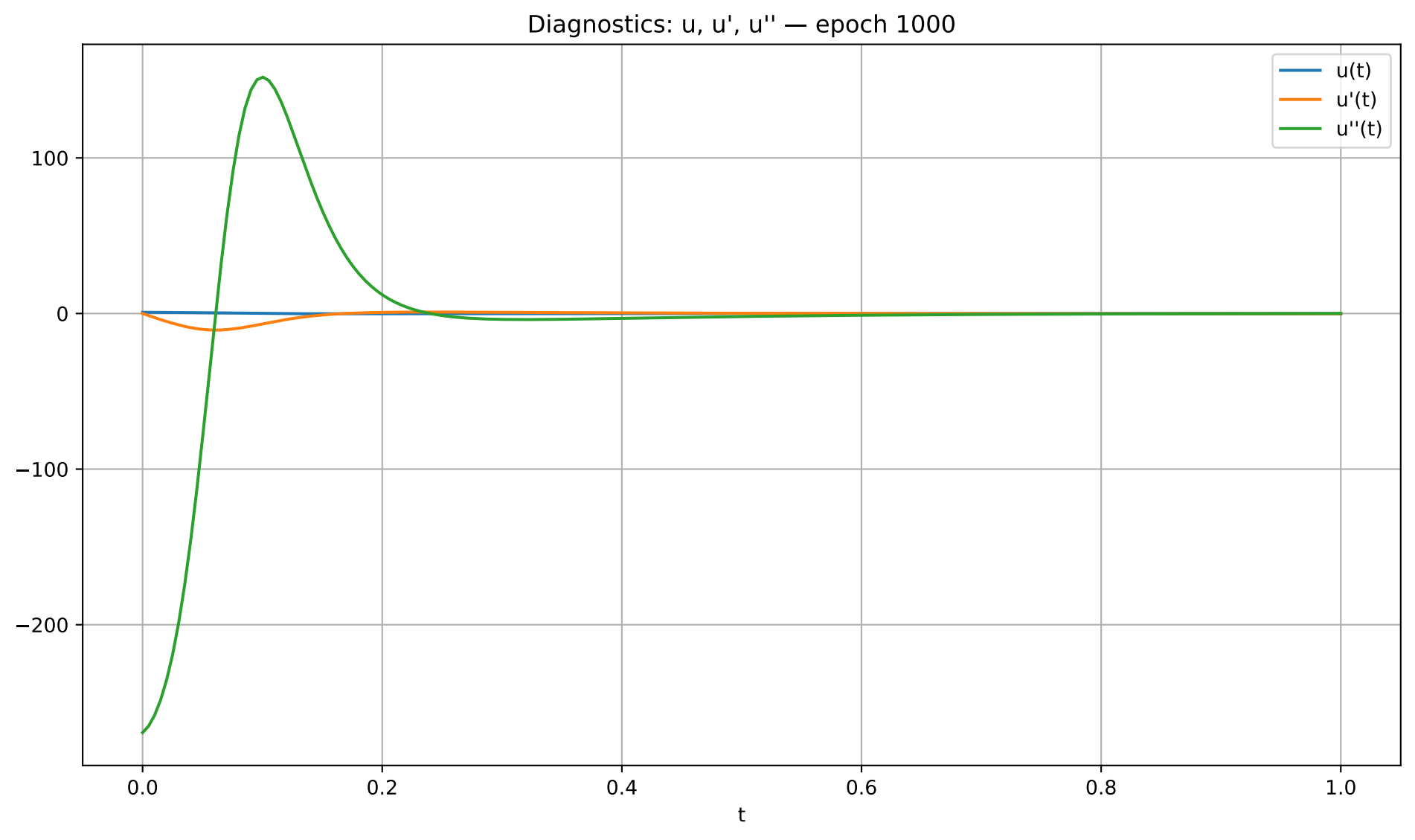

Prediction vs Exact — epoch 700
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

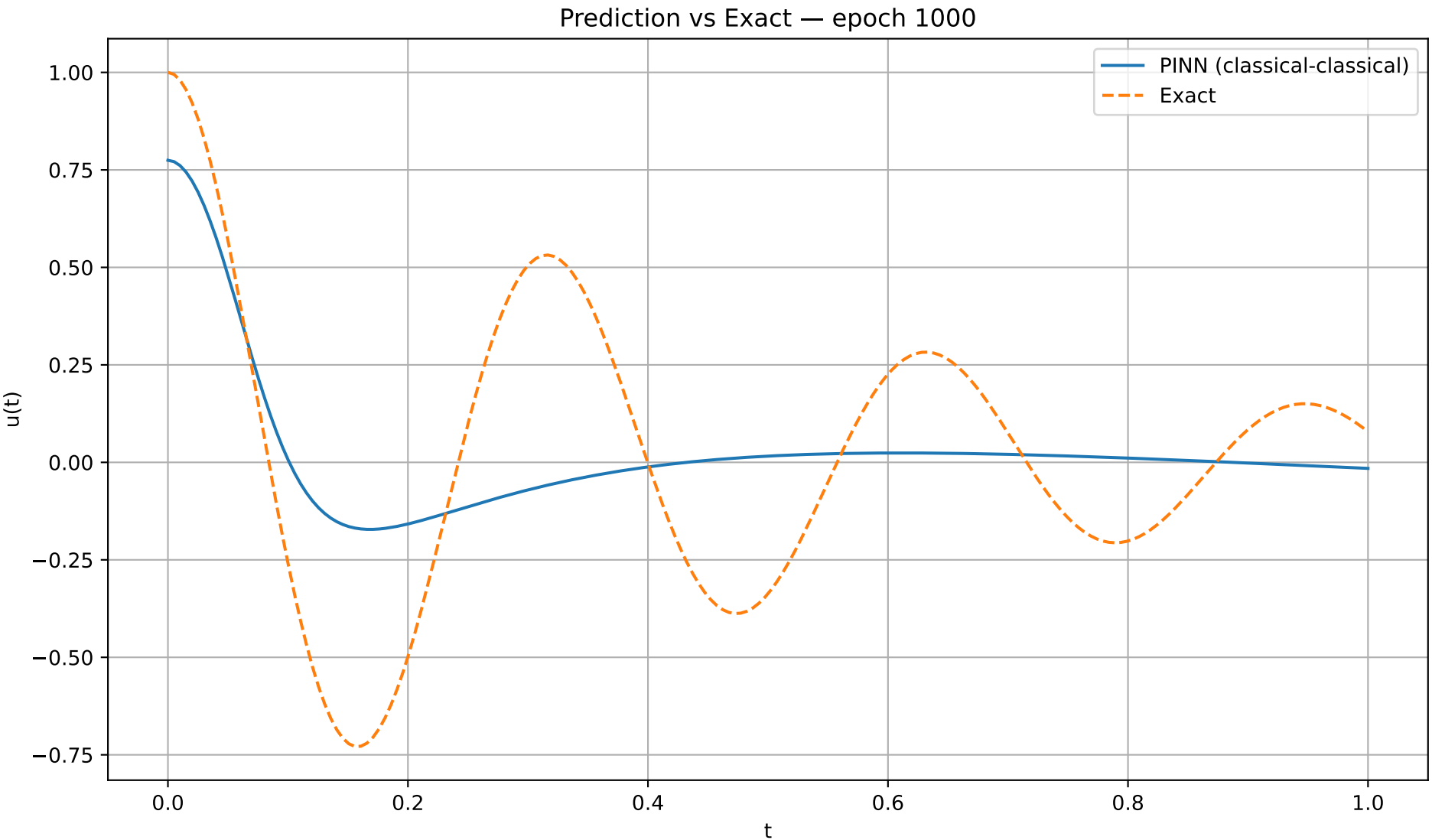

Diagnostics: u, u', u'' — epoch 800
u(t)
u'(t)
u''(t)
40
20
0
−20
−40
−60
−80
−100
0.0
0.2
0.4
0.6
0.8
1.0
t

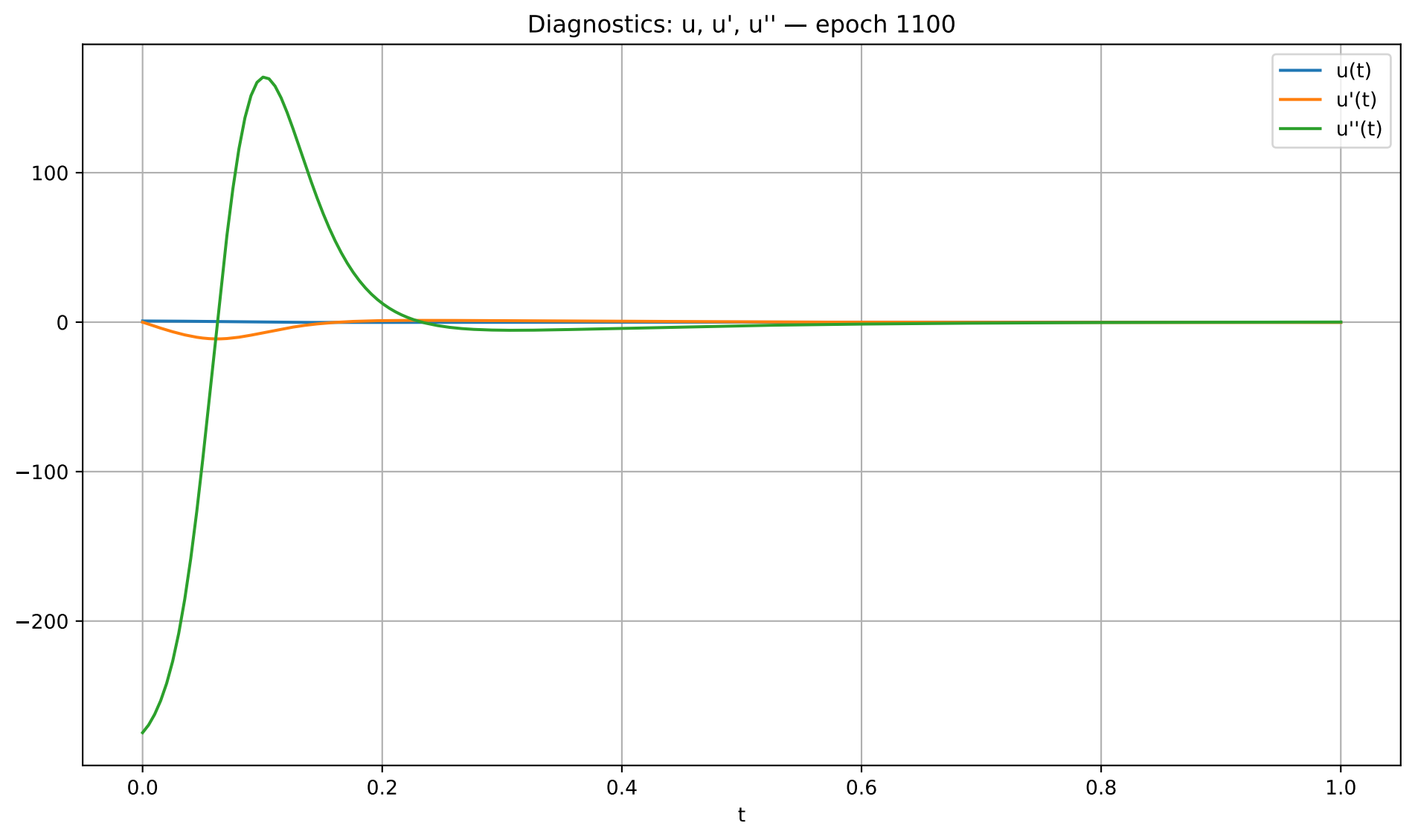

Prediction vs Exact — epoch 800
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

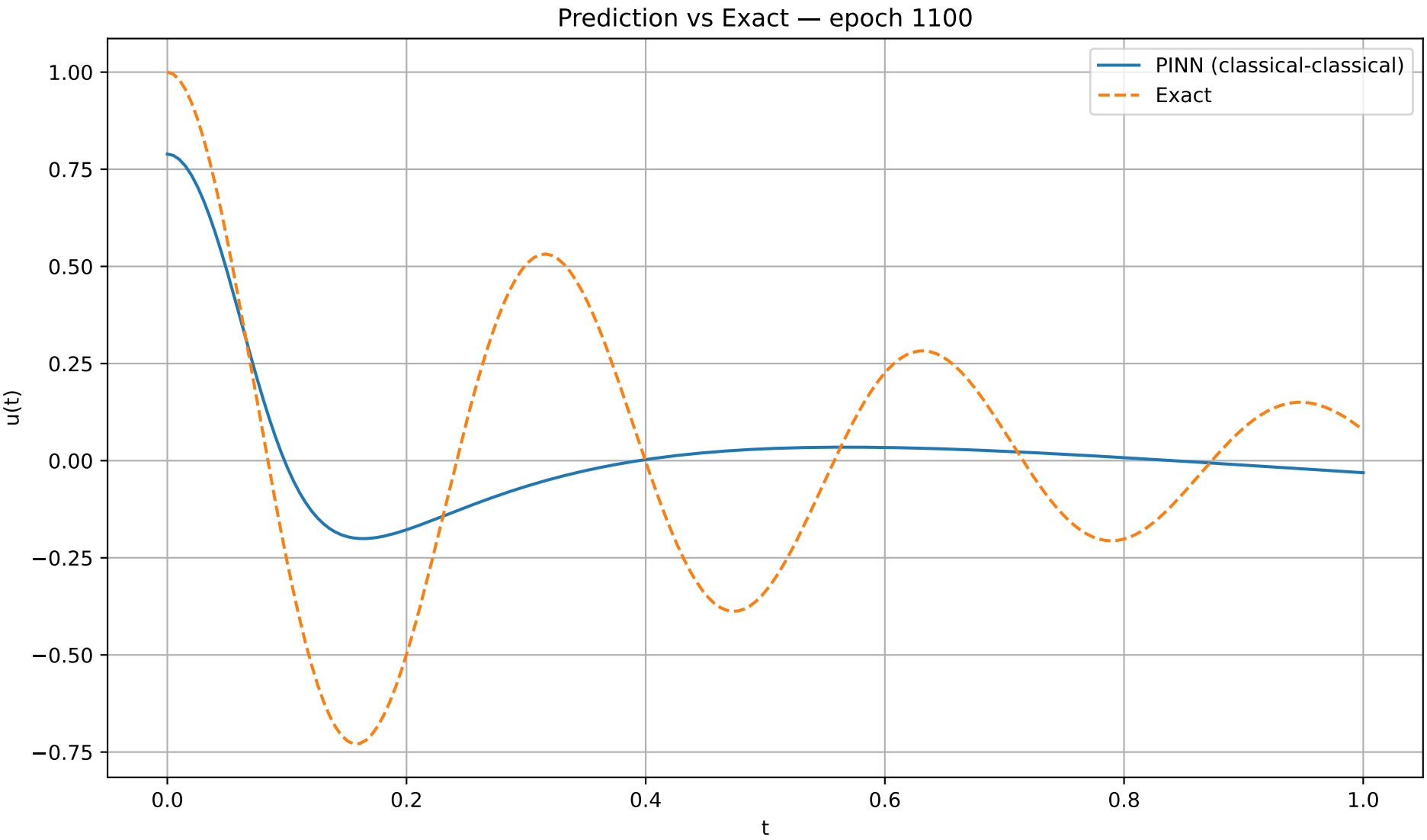

Diagnostics: u, u', u'' — epoch 900
u(t)
u'(t)
u''(t)
100
50
0
−50
−100
−150
−200
−250
0.0
0.2
0.4
0.6
0.8
1.0
t

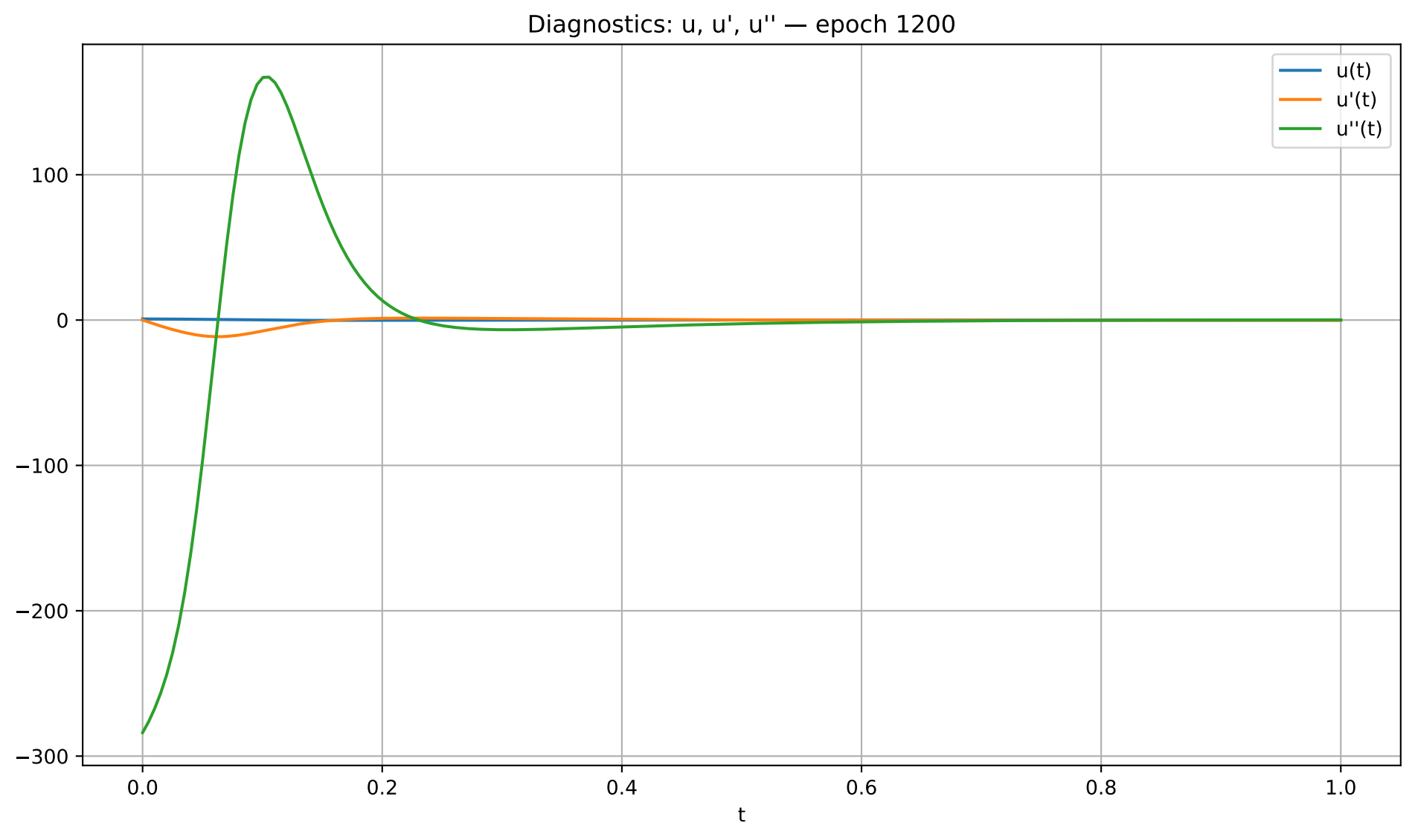

Prediction vs Exact — epoch 900
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

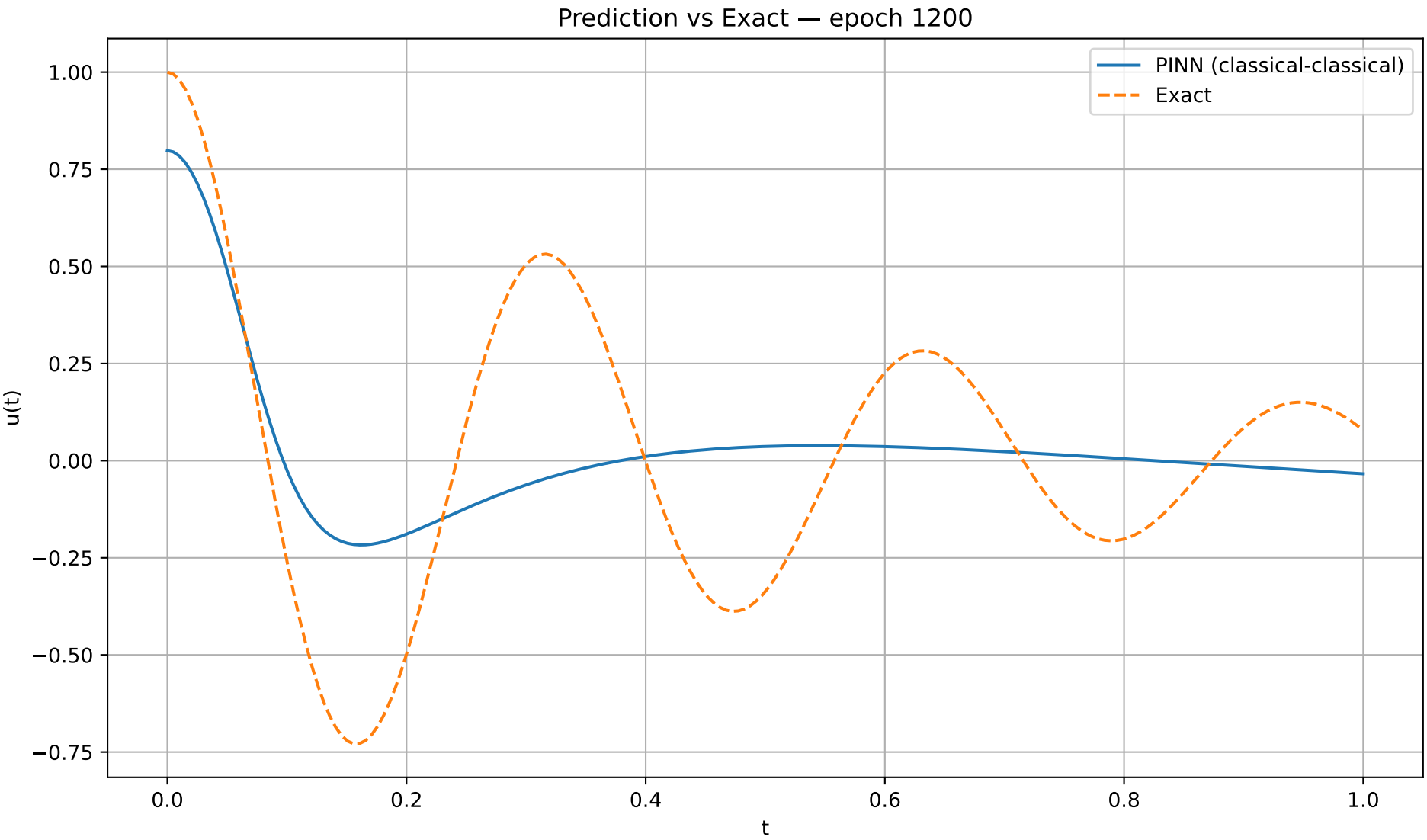

Diagnostics: u, u', u'' — epoch 1000
u(t)
u'(t)
u''(t)
100
0
−100
−200
0.0
0.2
0.4
0.6
0.8
1.0
t

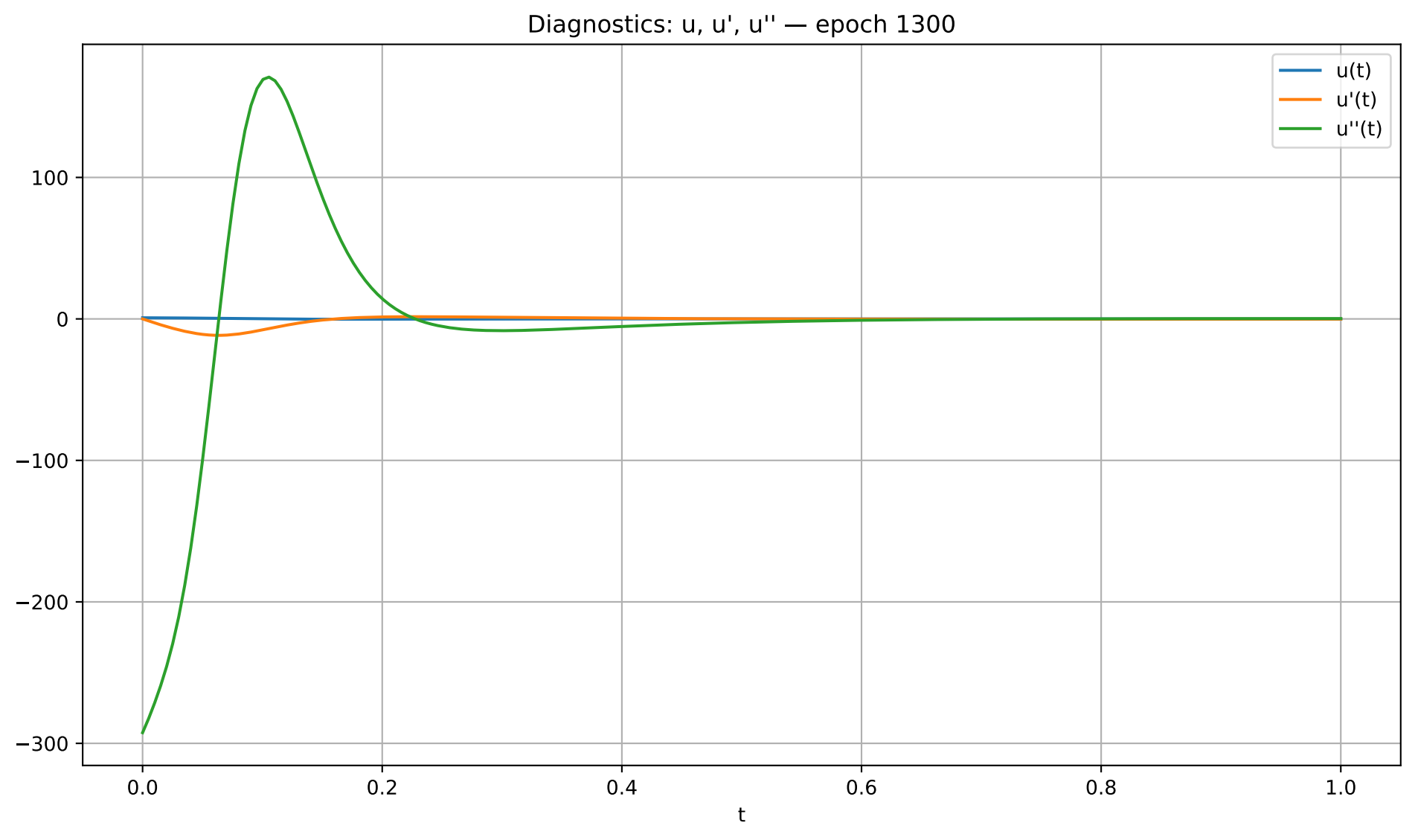

Prediction vs Exact — epoch 1000
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

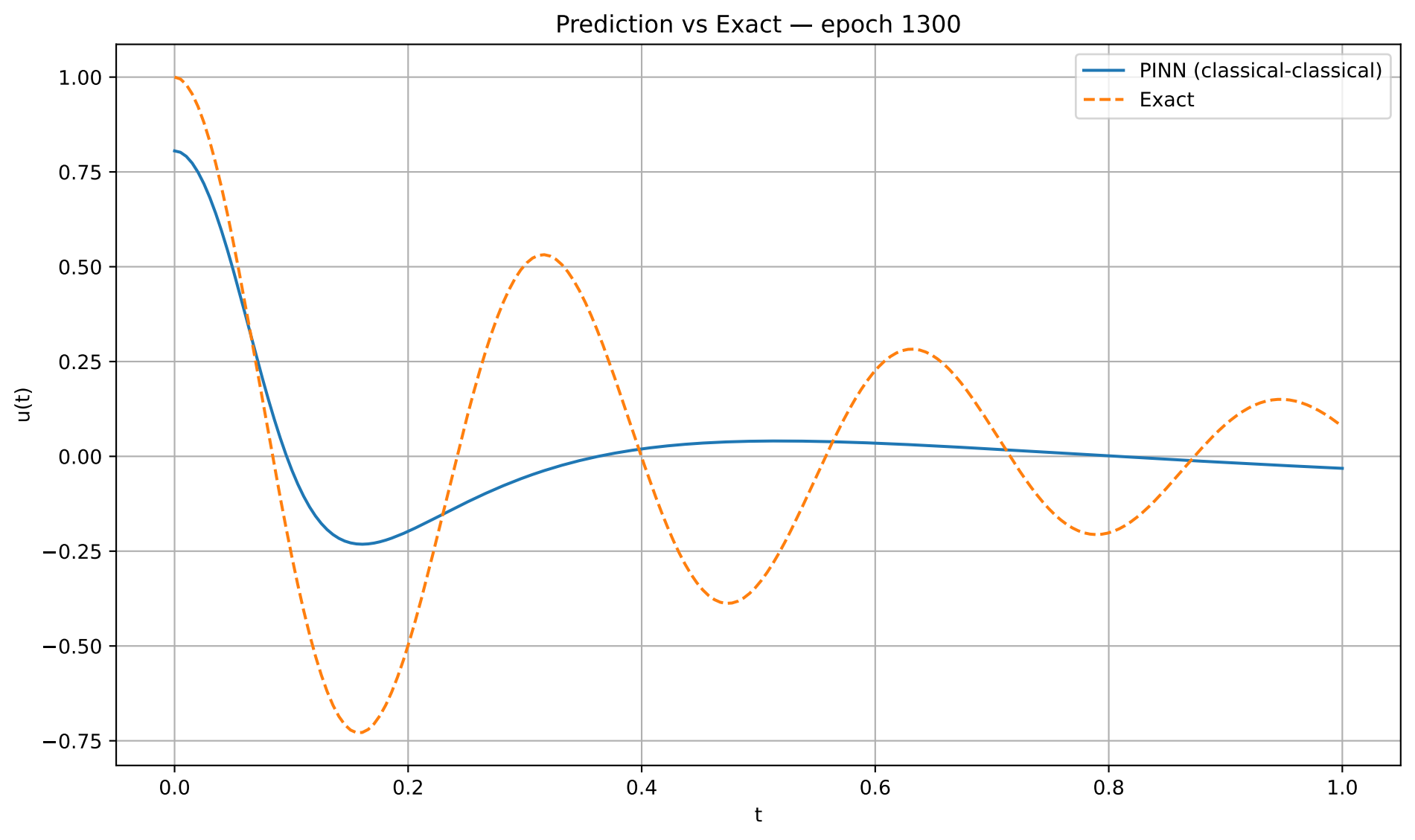

Diagnostics: u, u', u'' — epoch 1100
u(t)
u'(t)
u''(t)
100
0
−100
−200
0.0
0.2
0.4
0.6
0.8
1.0
t

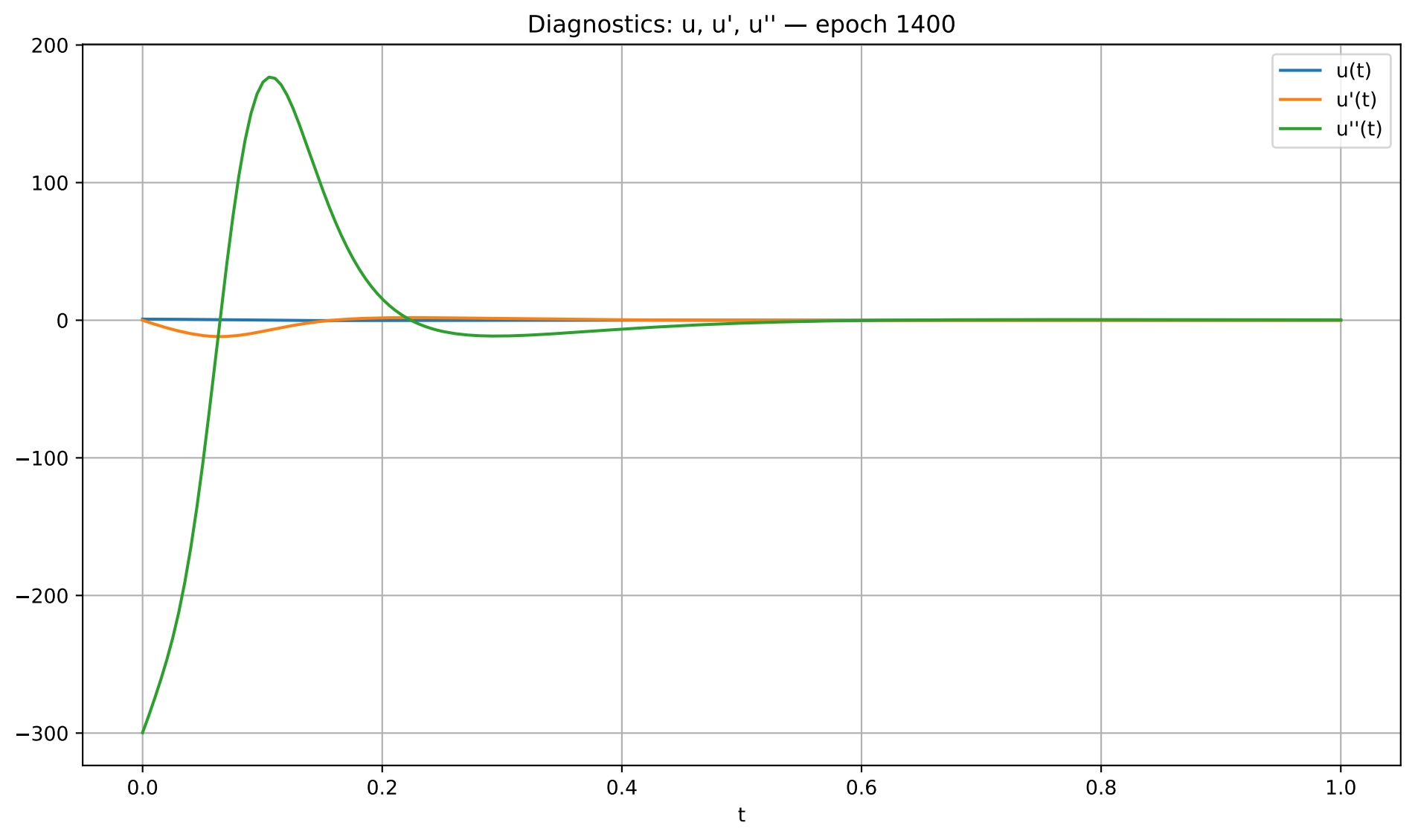

Prediction vs Exact — epoch 1100
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

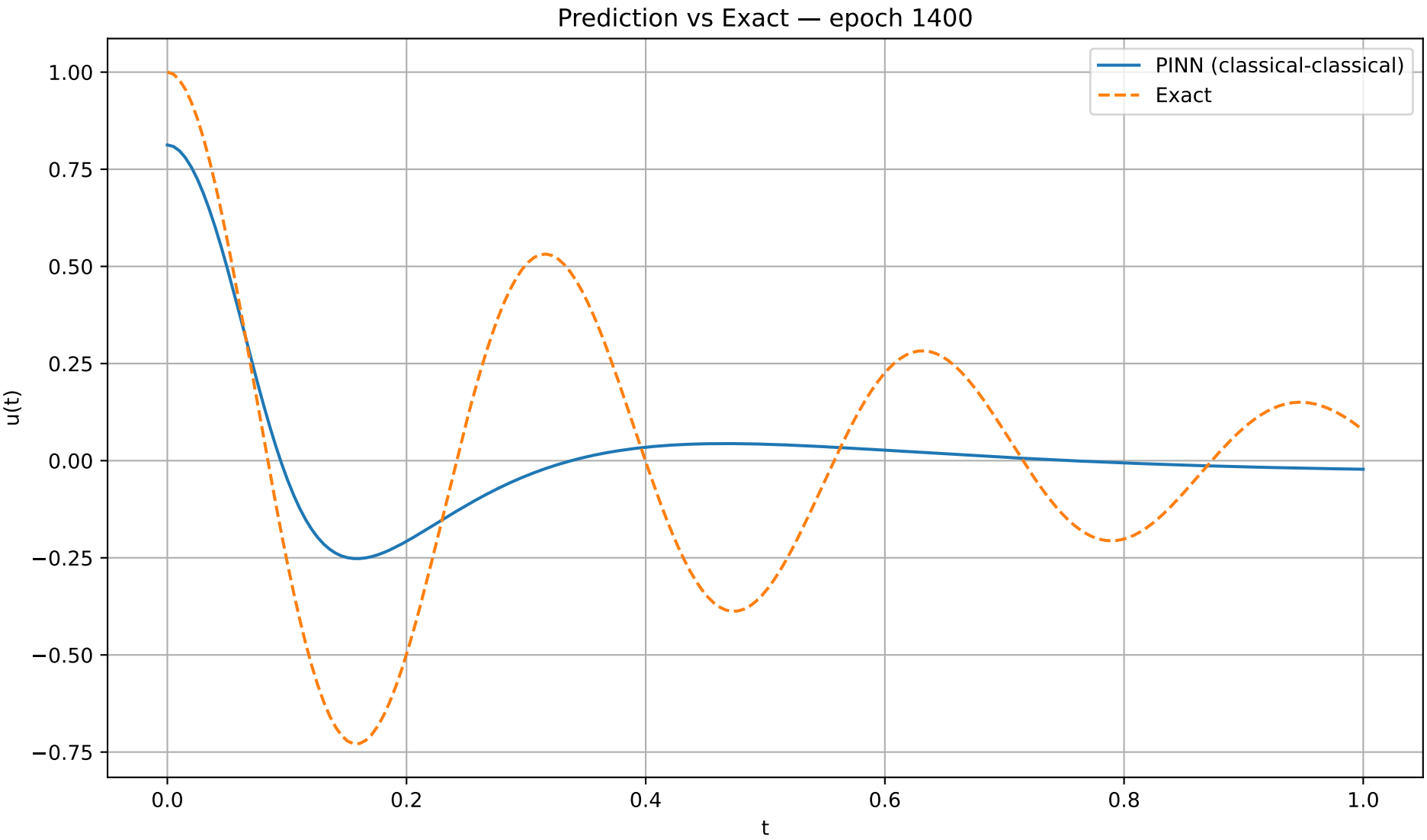

Diagnostics: u, u', u'' — epoch 1200
u(t)
u'(t)
u''(t)
100
0
−100
−200
−300
0.0
0.2
0.4
0.6
0.8
1.0
t

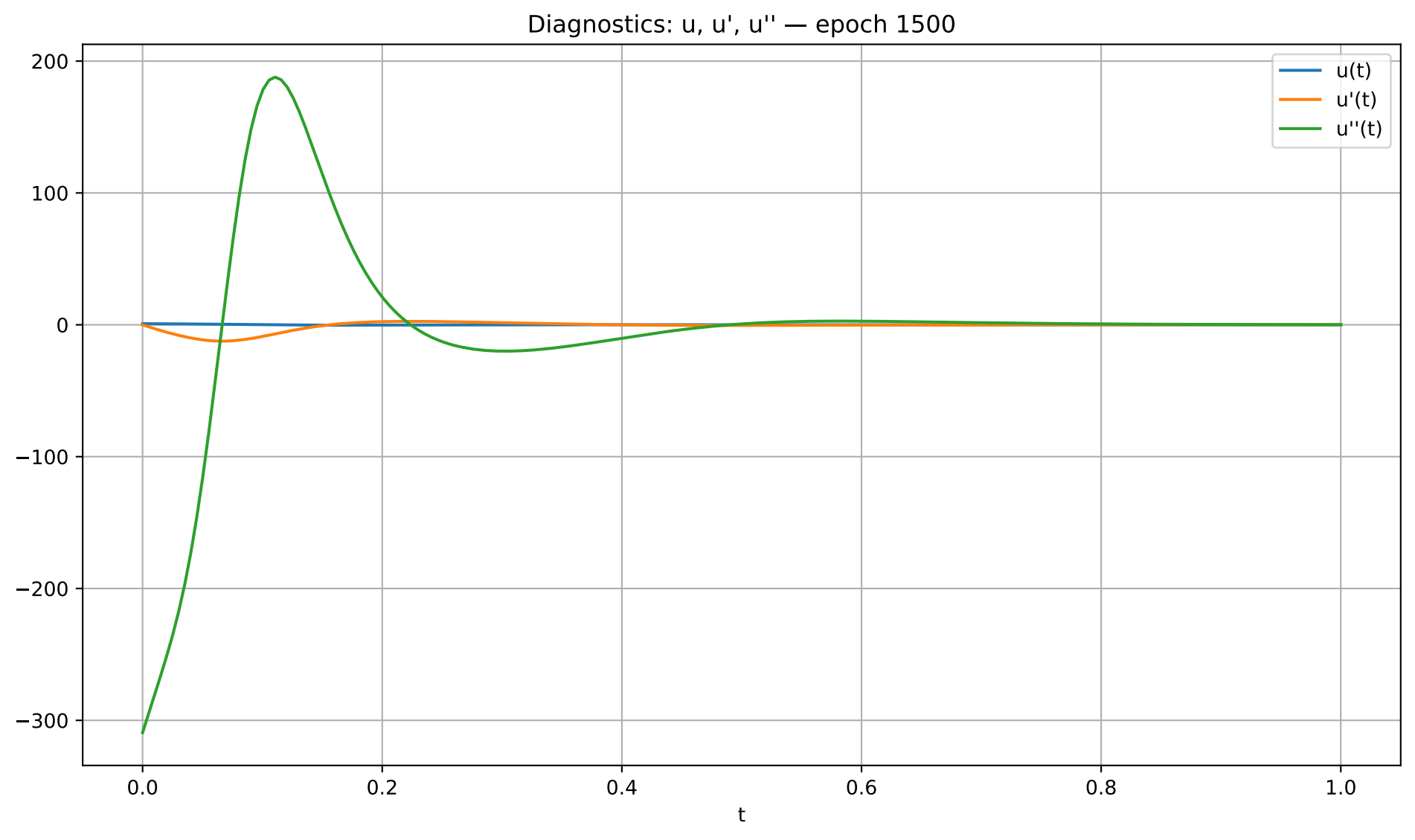

Prediction vs Exact — epoch 1200
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

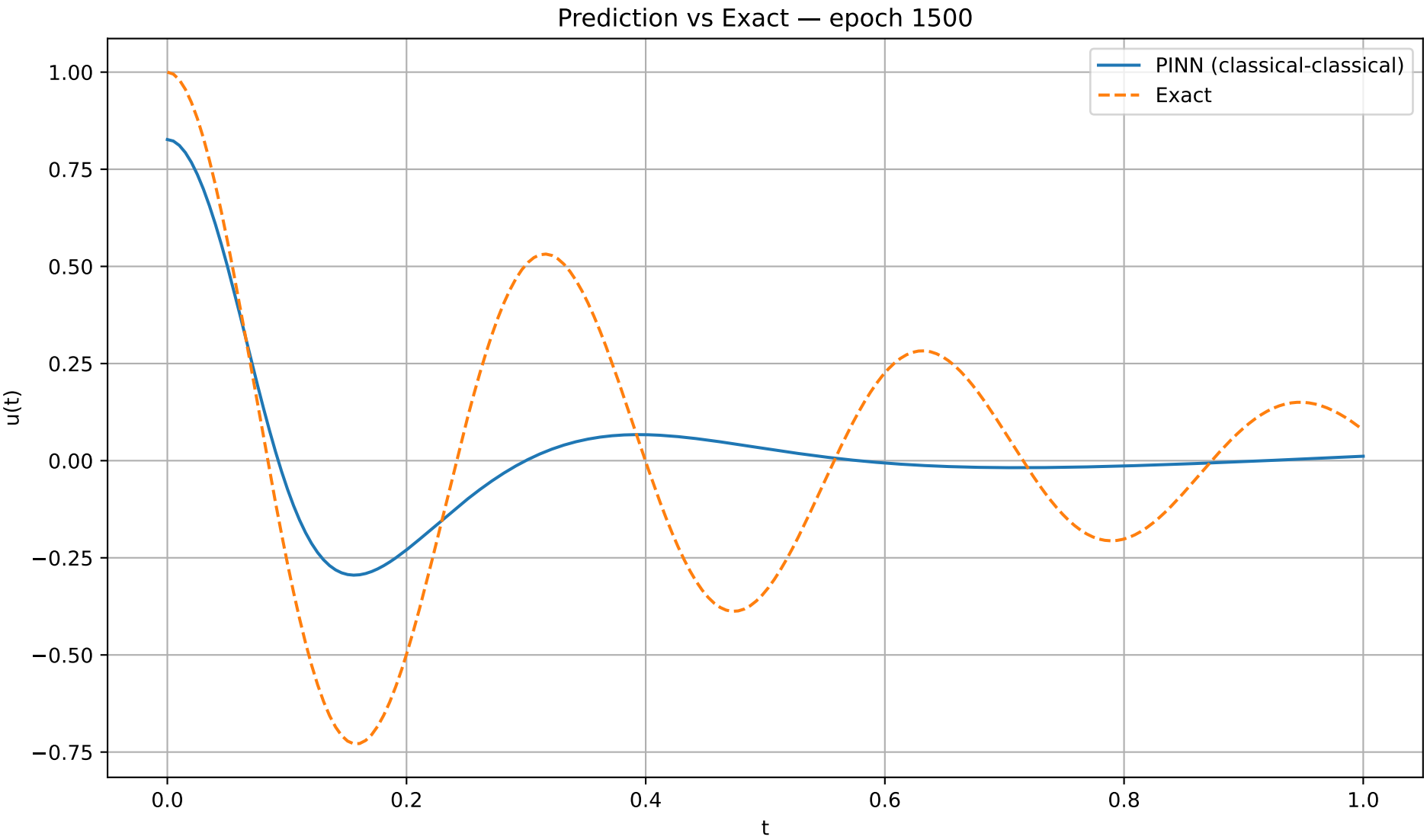

Diagnostics: u, u', u'' — epoch 1300
u(t)
u'(t)
u''(t)
100
0
−100
−200
−300
0.0
0.2
0.4
0.6
0.8
1.0
t

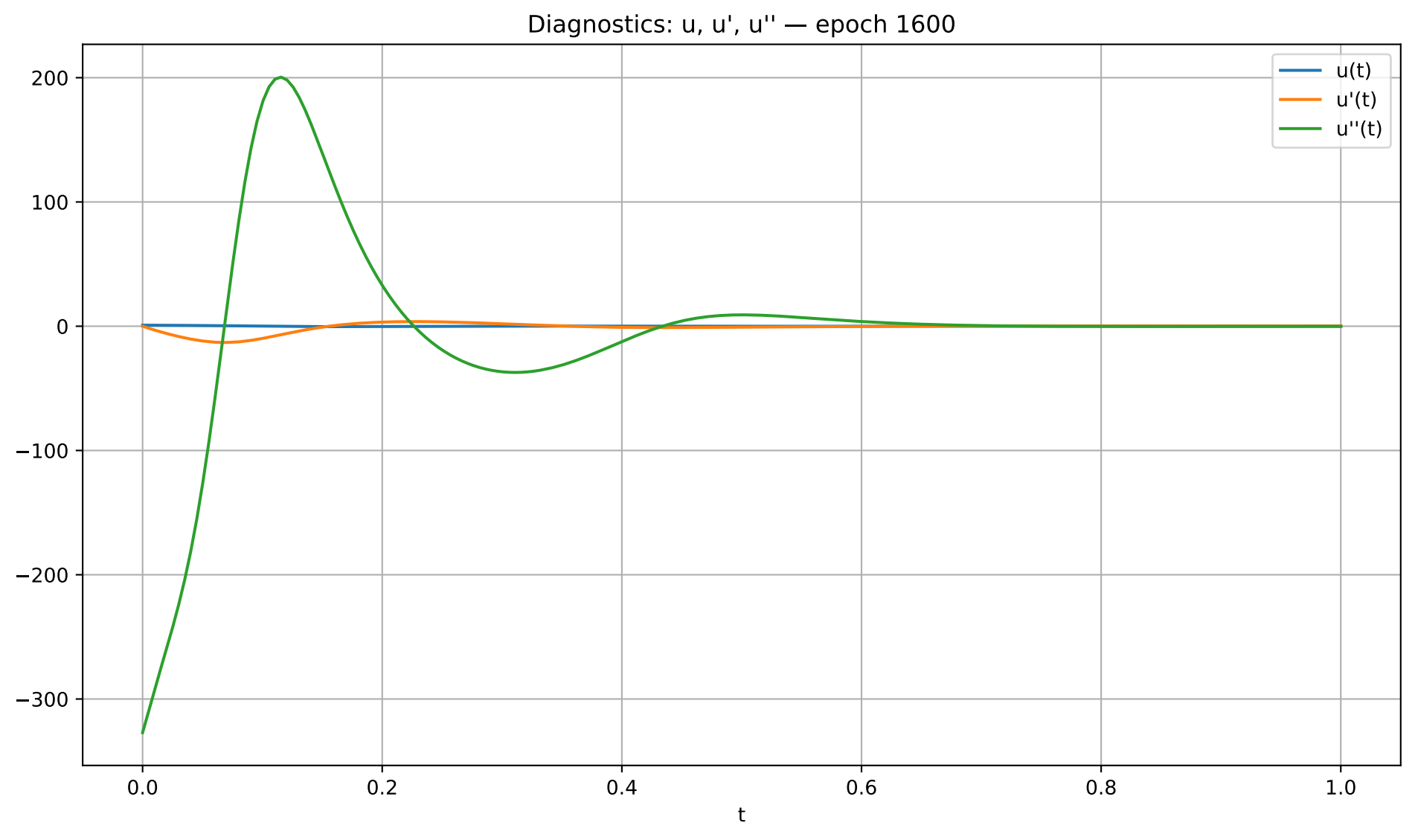

Prediction vs Exact — epoch 1300
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

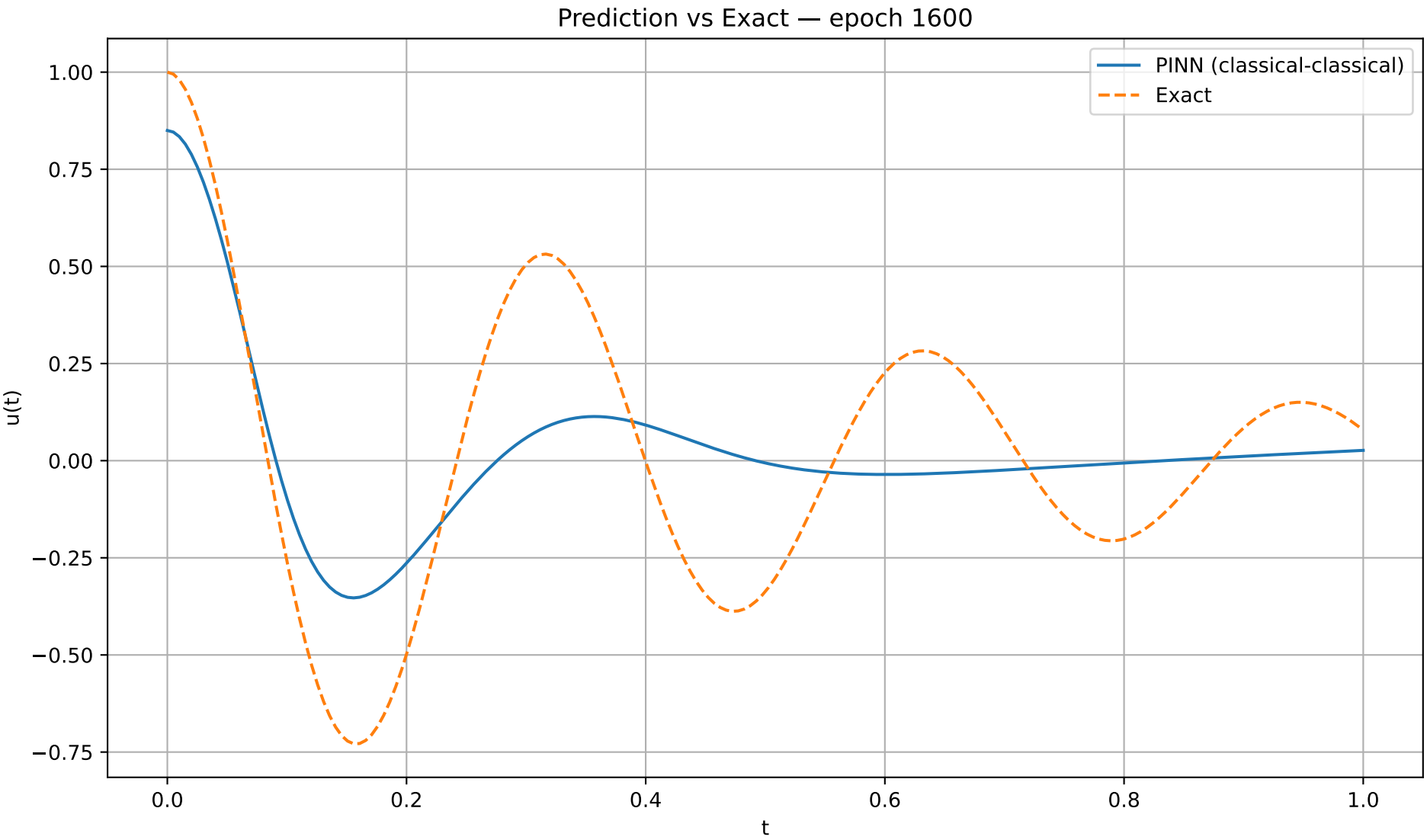

Diagnostics: u, u', u'' — epoch 1400
u(t)
u'(t)
u''(t)
200
100
0
−100
−200
−300
0.0
0.2
0.4
0.6
0.8
1.0
t

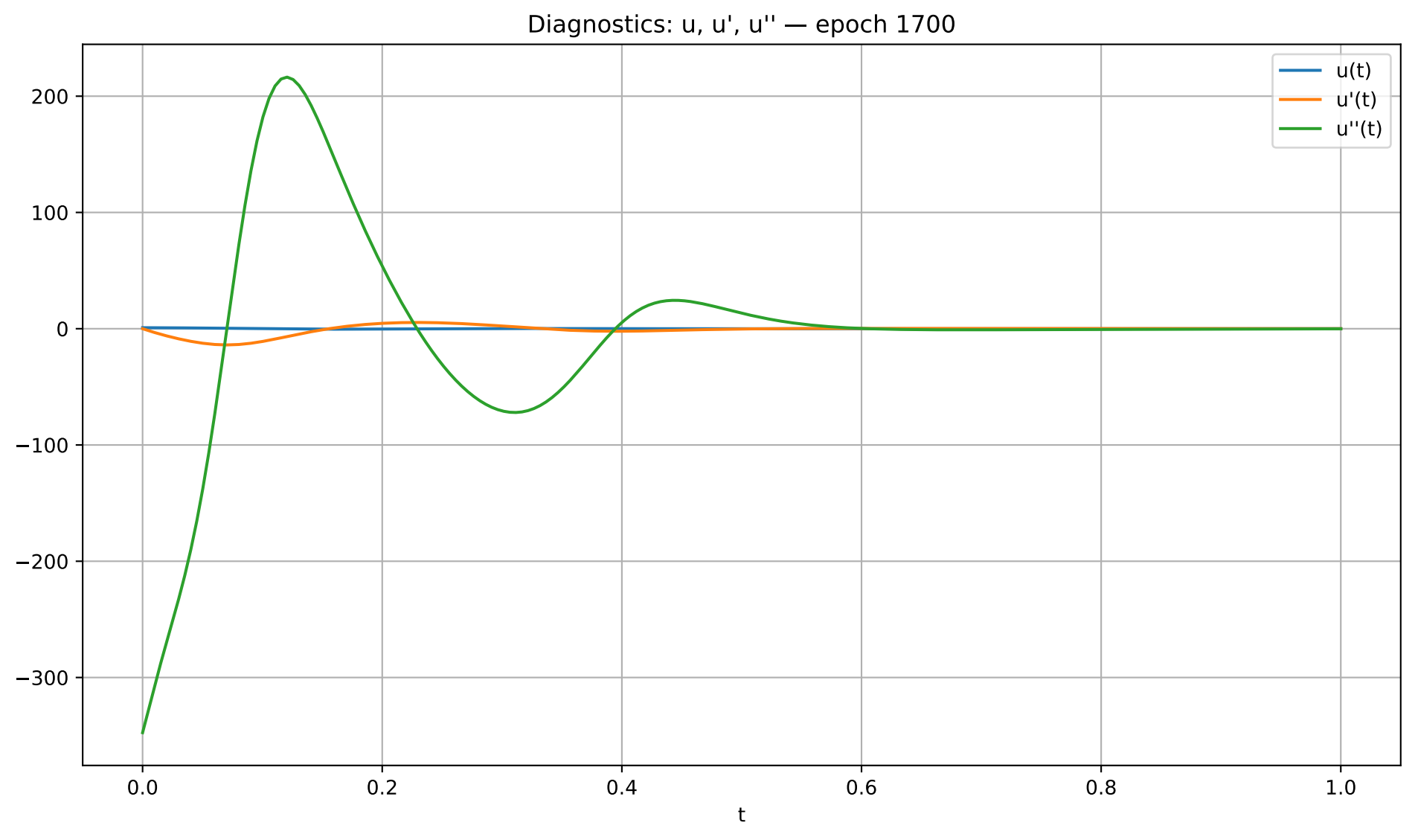

Prediction vs Exact — epoch 1400
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

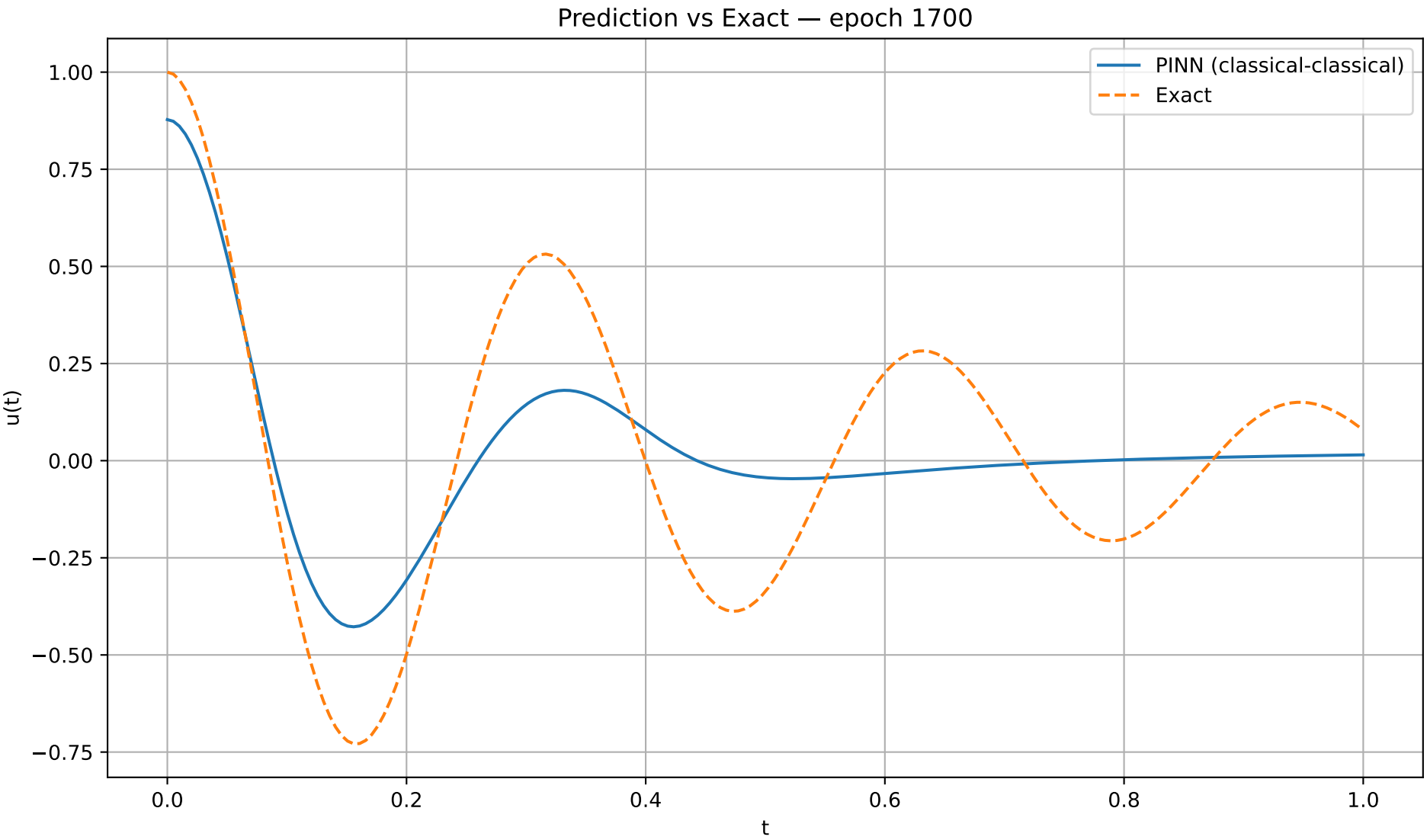

Diagnostics: u, u', u'' — epoch 1500
u(t)
u'(t)
u''(t)
200
100
0
−100
−200
−300
0.0
0.2
0.4
0.6
0.8
1.0
t

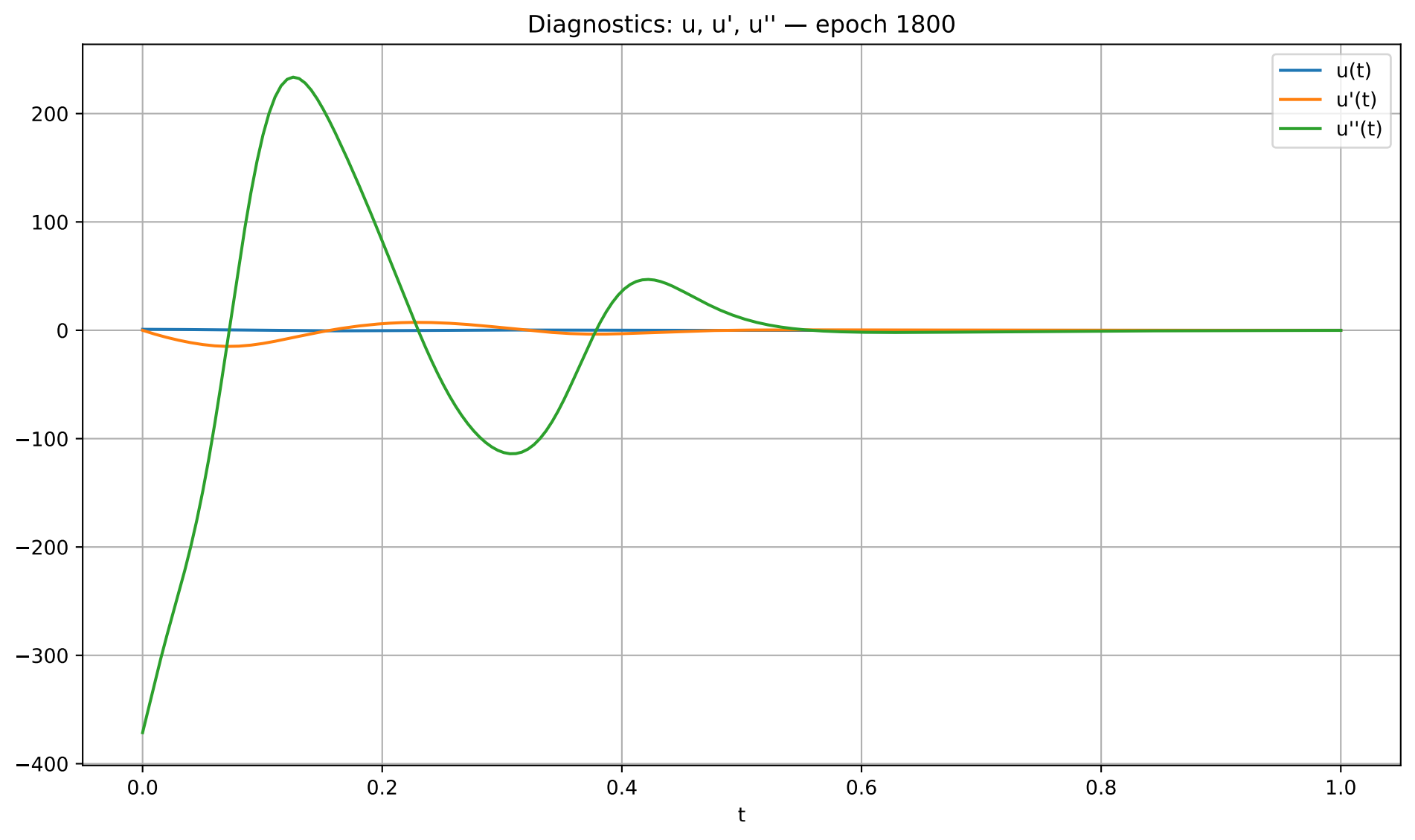

Prediction vs Exact — epoch 1500
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

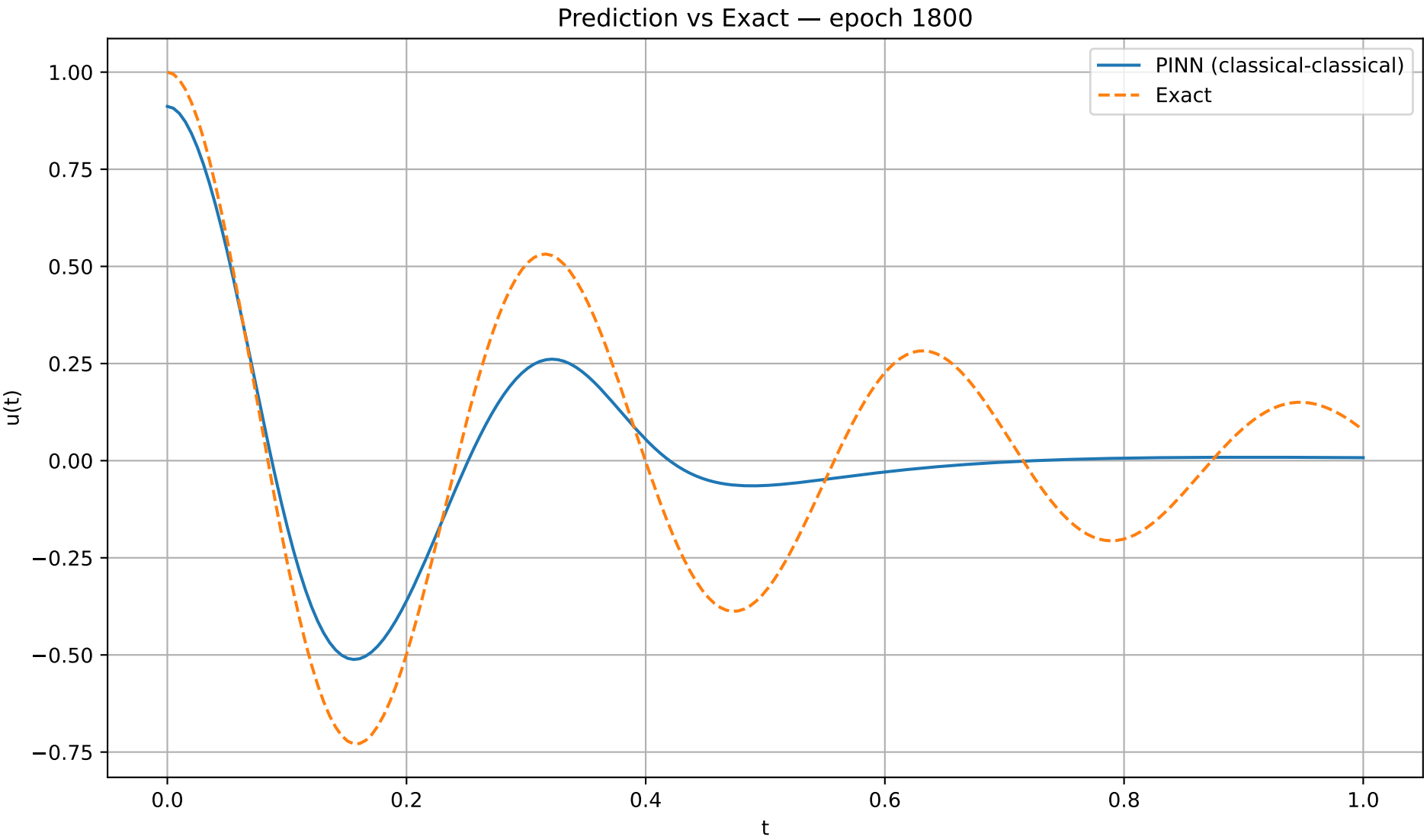

Diagnostics: u, u', u'' — epoch 1600
u(t)
u'(t)
u''(t)
200
100
0
−100
−200
−300
0.0
0.2
0.4
0.6
0.8
1.0
t

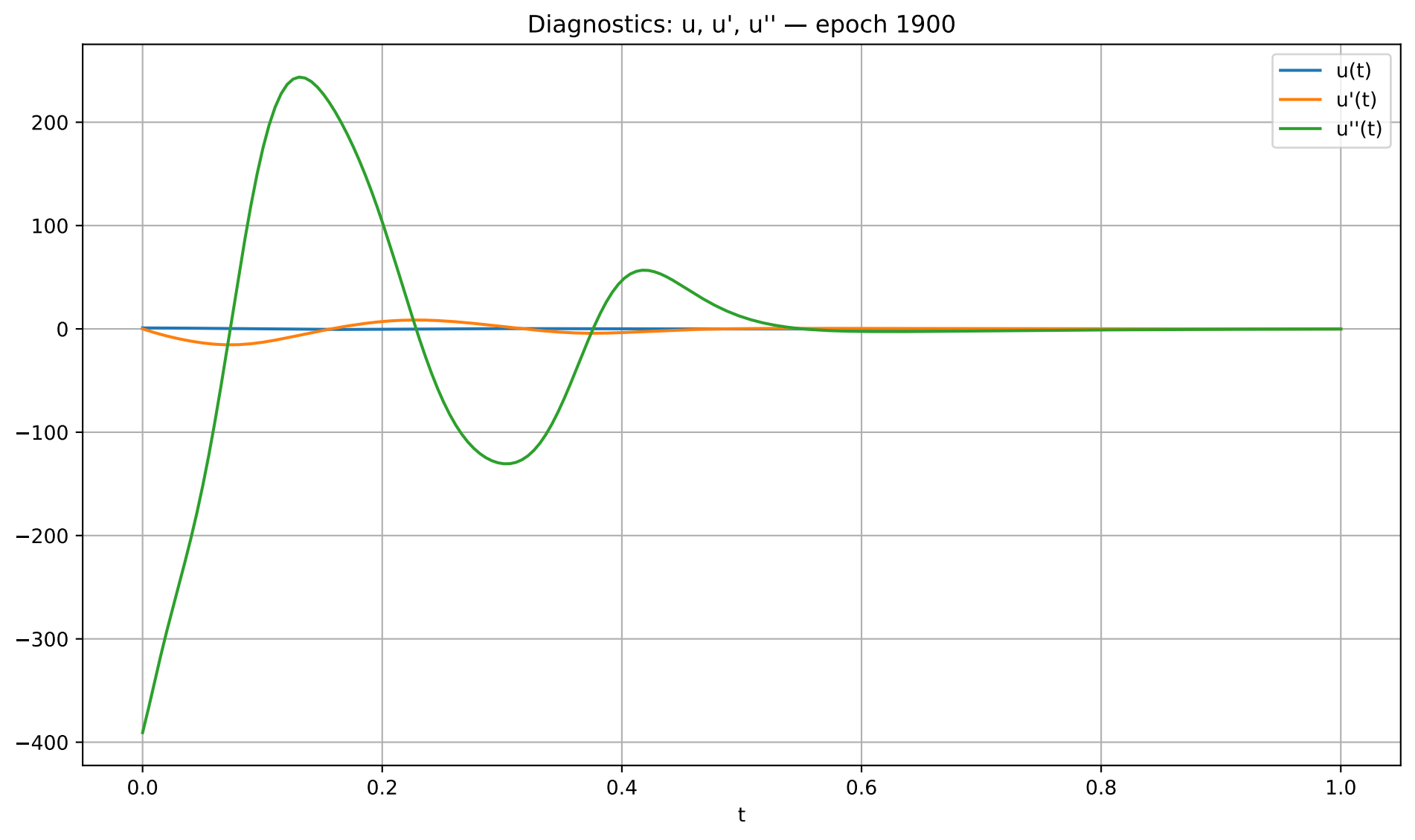

Prediction vs Exact — epoch 1600
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0

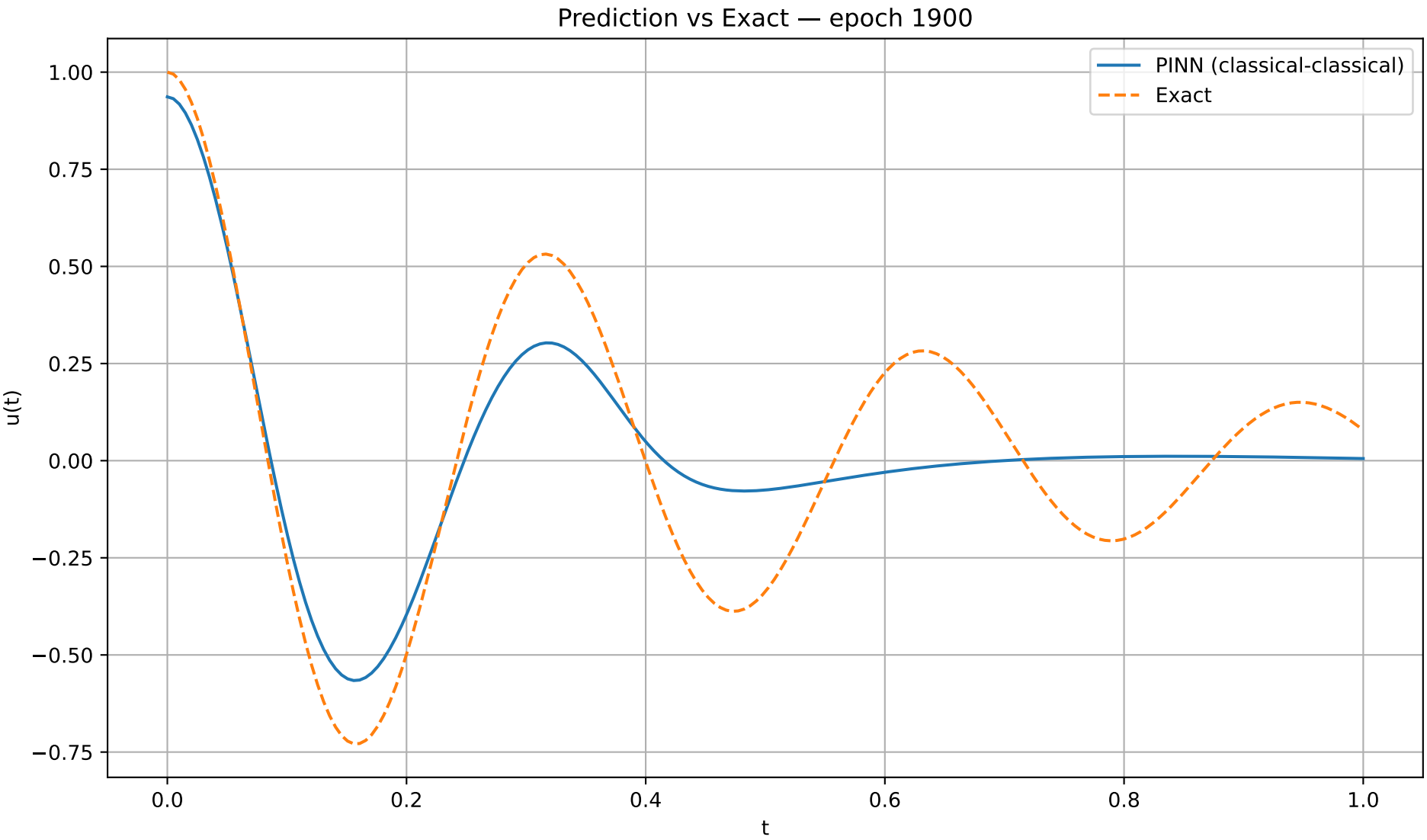

Diagnostics: u, u', u'' — epoch 1700
u(t)
u'(t)
u''(t)
200
100
0
−100
−200
−300
0.0
0.2
0.4
0.6
0.8
1.0
t


Prediction vs Exact — epoch 1700
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0


Diagnostics: u, u', u'' — epoch 1800
u(t)
u'(t)
u''(t)
200
100
0
−100
−200
−300
−400
0.0
0.2
0.4
0.6
0.8
1.0
t


Prediction vs Exact — epoch 1800
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0


Diagnostics: u, u', u'' — epoch 1900
u(t)
u'(t)
u''(t)
200
100
0
−100
−200
−300
−400
0.0
0.2
0.4
0.6
0.8
1.0
t


Prediction vs Exact — epoch 1900
PINN (classical-classical)
Exact
u(t)
t
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
0.0
0.2
0.4
0.6
0.8
1.0