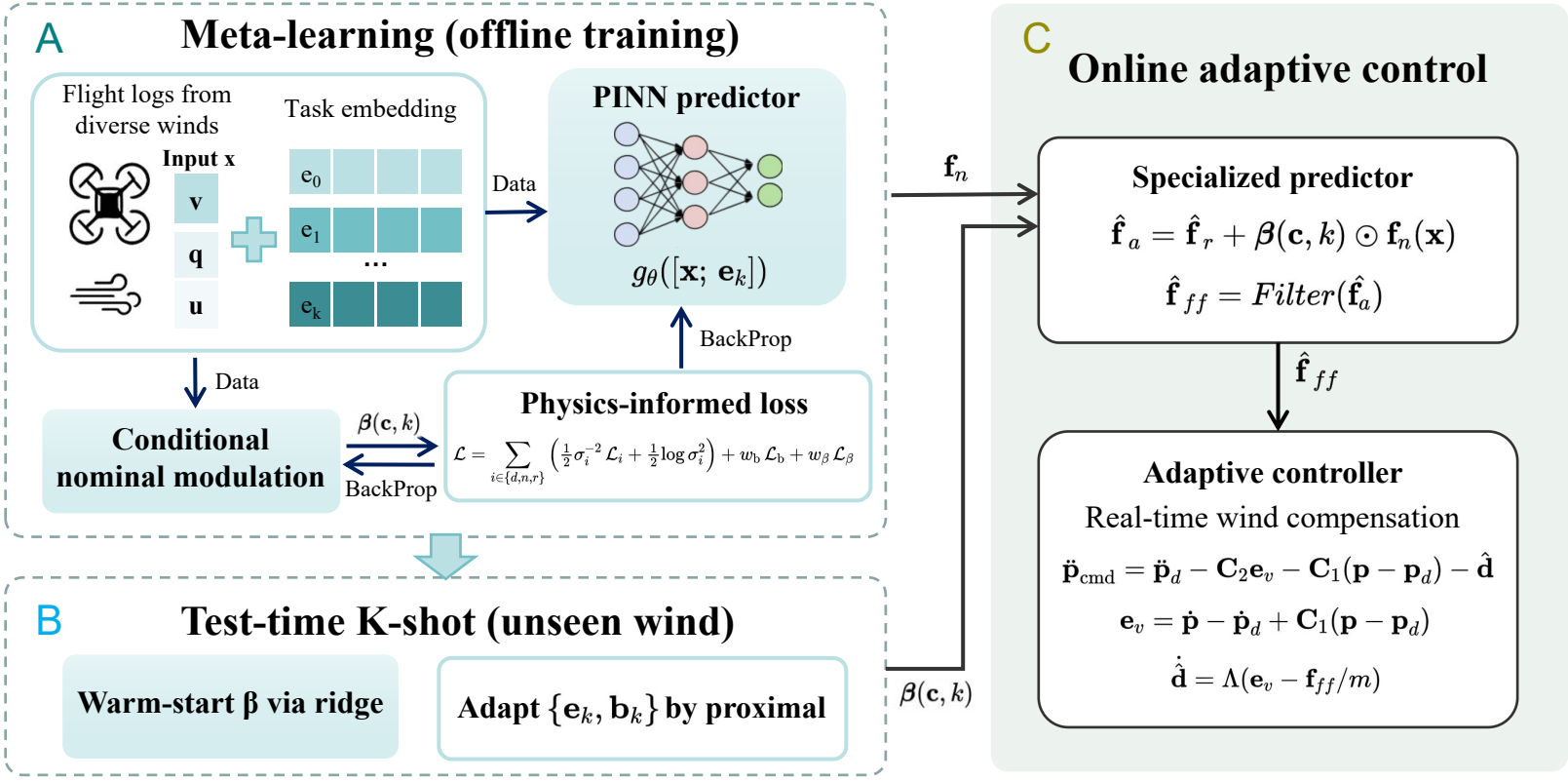
A
Meta-learning (offline training)
Flight logs from diverse winds
Input x
v
q
u
Task embedding
e0
e1
...
ek
Data
PINN predictor
gθ([x; ek])
BackProp
Data
Conditional nominal modulation
β(c, k)
BackProp
Physics-informed loss
L = Σ_{i∈{d,n,r}} (½σi^{-2} Li + ½ log σi^2) + wb Lb + wβ Lβ
B
Test-time K-shot (unseen wind)
Warm-start β via ridge
Adapt {ek, bk} by proximal
fn
β(c, k)
C
Online adaptive control
Specialized predictor
f̂a = f̂r + β(c, k) ⊙ fn(x)
f̂ff = Filter(f̂a)
f̂ff
Adaptive controller
Real-time wind compensation
p̈cmd = p̈d − C2ev − C1(p − pd) − d̂
ev = ṗ − ṗd + C1(p − pd)
d̂̇ = Λ(ev − fff/m)