Physics-Informed Active Learning for Port-Hamiltonian Systems

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***Abstract*—**

I. Introduction

Basic Introduction Port-Hamiltonian Systems (PHS) has been given in [1]. Survey papers on learning control techniques including reinforcement learning (RL), iterative control and for PHSs [2]–[4].

Reduced-order PHs [5], [6]

Gassian Process approach for modelling PHSs [7], [8] and then Bayesian Control for PHSs [9].

The first attemp using neural network to describe Hamiltonian systems [10]. Following the concept, [11]–[14] have applied physics-informed neural network (PINN) with well-chosen learning biases for modelling PHSs has established foundation of port-Hamiltonian neural network (PHNN).

Data-driven identificaiton of PHSs [15], [16]

A. Related Works

[16] **Pros:** can work to input-output data, interconnection of port-Hamiltonian systems (composite learning or identificaiton). **Cons:** No uncertatinty quantification. **Framework:** PHNN + composite PHSs

[11] **Pros:** can work to interconnection of port-Hamiltonian systems. **Cons:** Use state variables and no uncertatinty quantification. **Framework: Framework:** PHNN + composite PHSs

[7] **Pros:** uncertatinty quantification with noised data. **Cons:** Use state variables, prior GP assumption. **Framework: Framework:** GP-PHSs

B. Contribution

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