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Highlights of Keynote Speech at PCVS2024

To Control, Or Not to Control, That Is the Question: Why and How?

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Prof. Iqbal Mujtaba emphasized the critical role of control systems in ensuring productivity, quality, and profitability in industrial processes. His presentation focused on model-based and neural network-based control strategies, highlighting their applications, advantages, and implementation challenges.

1. The Necessity of Control Systems

Control is indispensable for maintaining process stability and achieving operational goals.
Optimal control parameters, such as temperature and flow rate, should be determined experimentally or through model-based techniques.

1.1 Control Strategies

Traditional approaches like Generalized Minimum Variance Control (GMC) provide precise results but require tuning and knowledge of physical parameters.

1.2 Neural Network-Based Control (NNBC)

Advantages: Simpler implementation, no need for parameter tuning, and adaptive learning with more data.
Applications: Effective for processes with limited knowledge of physical parameters.
Comparisons showed GMC often outperforms NNBC in precision, but NNBC excels in adaptability and ease of use.

2. Future Directions

a) Emphasis on integrating adaptive control systems to handle evolving process conditions.
b) Expanding machine learning and data-driven models for real-time optimization.

3. Closing Note

Prof. Mujtaba underscored that "not to control is not an option." Effective control systems are essential across industries to ensure operational excellence. While different methods suit different processes, the goal remains consistent: achieving stability, efficiency, and profitability through optimal control.