



Partial Enumeration Model Predictive Controller for MIMO Systems

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a fast method of predictive control for MIMO systems.

Overview

Large multiple input, multiple output (MIMO) systems are often controlled by model predictive control (MPC). One MPC strategy makes predictions of the system's actions by using complete enumeration strategies to solve the system for all possible solutions, and choosing the optimal one. However, as the size of the system increases by adding dimensions or lengthening the time span to be studied, the number of possible solutions increases rapidly, and the time required for complete enumeration becomes prohibitive.

The Invention

UW-Madison researchers have developed a method of predictive control for MIMO systems that is approximately 100 times faster than complete enumeration on industrial size applications. This approach compares system conditions to a table of known probable solutions. If any of those solutions are optimal, the model skips calculation. If none are optimal, a suboptimal solution is used, while the controller calculates the optimal solution and adds it to the table. The table of solutions is created by a training period in which expected parameters are modeled.

Applications

- Control of large MIMO systems

Key Benefits

- Table can be expanded with each new solution, or maintained with a fixed length by deleting old or unused solutions
- Table adapts with use
- Solves large-scale model predictive control problems
- Requires fewer calculations
- Quick running model predictive control
- Best suboptimal solution is selected by selecting the solution with the fewest possible differences from the optimal solution

Additional Information

For More Information About the Inventors

- [Stephen Wright](#)

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