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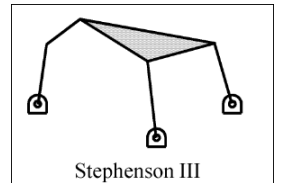
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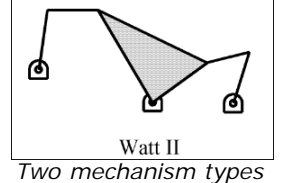
A Novel Approach to Planar Mechanism Synthesis Using HEEDS

Application Brief

The problem of mechanism synthesis (or design) is deceptively complex and has been a subject of much attention since soon after the discovery of the wheel. This application brief describes a novel approach to automated mechanism synthesis in which "convertible agents" are used to find the most appropriate mechanism type for a given problem, while simultaneously finding an optimum set of dimensions for that mechanism to realize a specified behavior.



Stephenson III



Watt II

Two mechanism types considered in the current study.

This convertible agent technique has been developed in response to the unique design challenges encountered when synthesizing a mechanism for both type and dimensionality. The synthesis technique selects the best-suited mechanism type from a set of different planar single-degree-of-freedom mechanism types, and optimizes its dimensions to meet the design objective at hand. The method is readily scalable to account for any number of different mechanism types and complexities.

The convertible agent approach is also well suited for design applications outside of mechanism synthesis, in which there are a small number of distinct topological design possibilities, each with parametric variables to be optimized.

[Read the entire application brief](#)

Using Constraints to Improve Pareto Front Resolution

HEEDS Technical Tip

Each point on a Pareto front plot represents an optimal design, in the respect that there is no other point in the design space with better values for both of the objectives. The goal of a multi-objective optimization study is to use these design points to identify the region of the Pareto front that represents a good balance between the values of the two objectives.

To capture the trade-offs between objectives, it is important to have good resolution in the region of interest on the Pareto front curve. In HEEDS, the resolution of the Pareto front is determined by the archive size (the number of points on the plot, per cycle), which you specify. The larger the archive size, the higher the resolution. However, a larger archive size also increases the total number of design evaluations required to generate the optimal Pareto front.

In this tip, we will demonstrate how to effectively improve the resolution of the Pareto front without increasing the archive size.

[Read the entire tip](#)

Red Cedar's Co-founder To Direct New NSF-Funded Research Center

Announcement

Red Cedar Technology's co-founder and CTO, Dr. Erik Goodman, will serve as the Director of the newly funded BEACON center at Michigan State University. The center was recently awarded one of five \$25 million National Science Foundation (NSF) grants.

The center's acronym, BEACON, stands for Bio/computation Evolution in Action CONSortium. The center will foster collaboration among evolutionary biologists, engineers, and computer scientists who are using evolutionary processes to solve real-world problems.



Dr. Erik Goodman

Ron Averill, President and CEO of Red Cedar Technology, added "We are very proud of Erik for his contributions and leadership in the field of evolutionary computing and optimization. We look forward to the continued mutual benefits of Red Cedar's relationship with Erik and Michigan State University."

Upcoming Events

Announcement



Dr. Ron Averill, CEO

Materials Technical Session 2010 SAE World Congress April 13, Detroit, MI

Dr. Ron Averill, Red Cedar's President and CEO, will be giving the keynote lecture for the Materials Technical Session at the 2010 SAE World Congress in Detroit.

The title of Dr. Averill's lecture is *Crash Optimization of Components with Full System Coupling*. The lecture is scheduled for Tuesday, April 13 at 8:00 am.

We hope to see you there!

HEEDS with Guides

Announcement

HEEDS Professional customers frequently ask us for more information about how to use HEEDS with their preferred design and analysis tools. In response to these requests, we are continually expanding our selection of *HEEDS with guides*. The following guides are currently available to our customers at no cost.

HEEDS Professional with

- Abaqus
- ADVISOR
- Catia
- DEP Morpher
- Excel
- Fluent
- HyperMorph
- LS-DYNA
- Matlab
- Moldflow

MSC Nastran

- NX
- Patran
- Solidworks
- NEi Nastran

If you'd like to request a PDF of any of these guides, please email us at support@redcedartech.com.

As always, we hope you have found this issue informative and interesting. If you have questions or feedback, please don't hesitate to contact us.

Sincerely,

The Red Cedar Technology Team

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