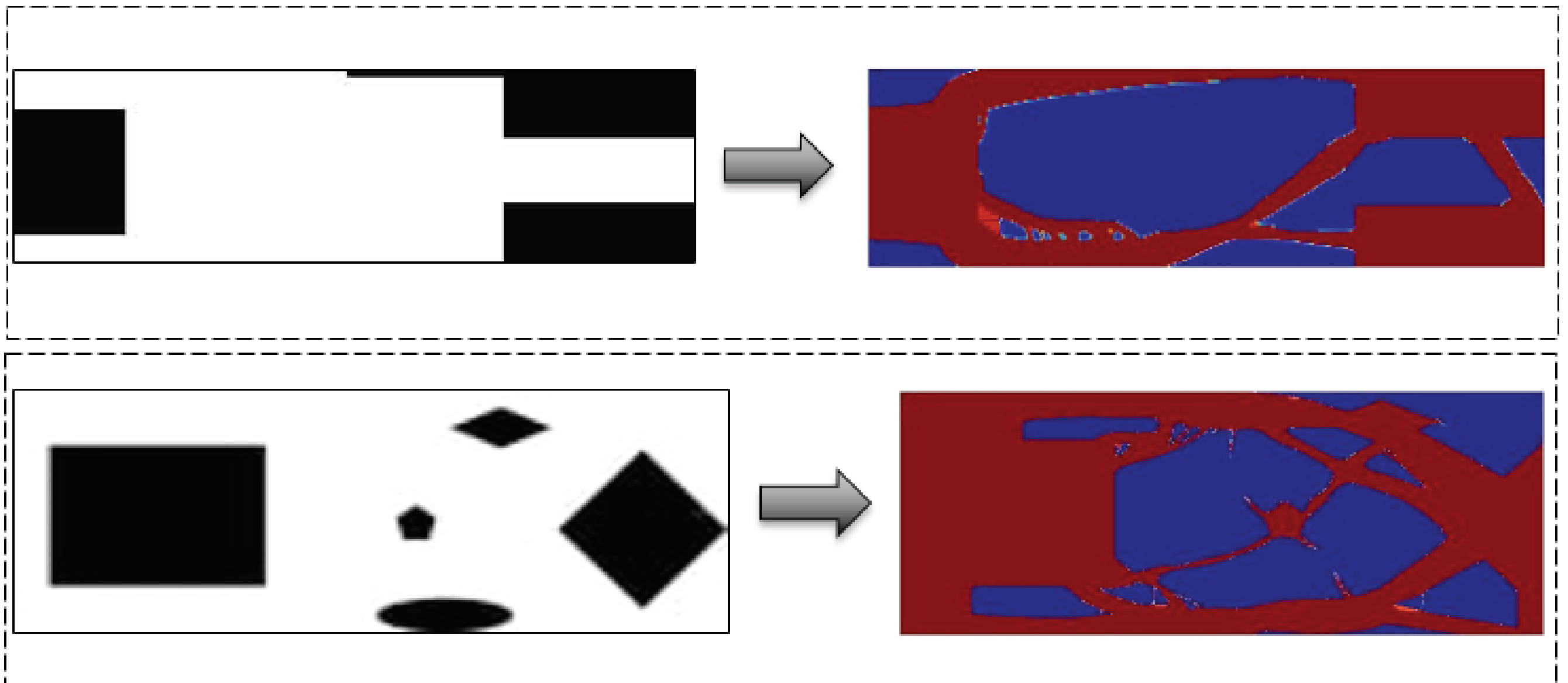


Future of Lightweighting Entry



Hiroshima University

Topology optimization process

Structural Design has historically been a mental process based on the designer's judgments and experience. The way of approaching the design problem will vary, according to the designer's experience and vision. With the verge of topology optimization, and the modern numerical method of structural analysis; computer aided design reached new level by fully developing designs based on mathematical optimization principals.

Fully computer-based evaluation and design is a goal yet to be reached. Such a goal is a necessity for futuristic transportation missions, such as deep space missions. In such missions, due to the large distance from the control center; the information of ship safety, and / or damaged parts (by asteroid impact or mechanical fatigue) cannot be repaired by crew members because they are theoretically in deep hibernation.

The futuristic deep space missions such as mining can have in human crew in it. This might require artificial intelligence to step in and deal with the design process by itself. One of the tools that AI can presumably create is an efficient mathematical based design process. Topology optimization is one of the effective methodologies in mechanical design. Specially it is proven to be effective when it associated with additive manufacturing. Implemented Image processing-based topology optimization will set the process free, so it can be fully autonomous.

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