Proceedings of the IAISAE 2020
International Conference on Thermodynamics 2.0
June 22-24, 2020 | Worcester, MA, USA

ICT2.0:2020-W146

FUNCTIONAL INTERDEPENDENCE IN COUPLED DISSIPATIVE STRUCTURES: PHYSICAL FOUNDATIONS OF BIOLOGICAL COORDINATION

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ABSTRACT

Biological behavior requires the dynamic and adaptive coordination of many degrees of freedom, within and between organisms. This coordination may be attributed to the self-organization of physiological degrees of freedom into assemblies called *coordinative structures*. Coordinative structures are contextually flexible and functionally-specific, allowing for stable performance in the face of perturbations. As an example, consider the body-wide adjustments made when we misstep while walking – distal physiological components alter their activity to maintain system stability. This phenomenon is known as *reciprocal compensation*. Reciprocal compensation can be demonstrated in a non-living self-organized system, a *dissipative structure*. We present evidence for this adaptive flexibility in an electrical dissipative structure, and motivate a shared physics underwriting the coordination of both living and non-living self-organizing systems.

Keywords: Coordinative structures, reciprocal compensation, dissipative structure

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