Dynamics on Differential One-Forms

By Troy Story

iUniverse. Paperback. Book Condition: New. Paperback. 128 pages. Dimensions: 8.5in. x 6.7in. x 0.3in.Dynamics on Differential One-Forms proposes a unifying principle for mathematical models of dynamic systems. In Thermodynamics on One-Forms (chapter I), the long-standing problem of deriving irreversibility in thermodynamics from reversibility in Hamiltonian mechanics, is solved. Differential geometric analysis shows thermodynamics and Hamiltonian mechanics are both irreversible on representative extended phase spaces. Dynamics on Differential One-Forms (II) generalizes (I) to Hamiltonian mechanics, geometric optics, thermodynamics, black holes, electromagnetic fields and string fields. Mathematical models for these systems are revealed as representations of a unifying principle; namely, description of a dynamic system with a characteristic differential one-form on an odd-dimensional differentiable manifold leads, by analysis with exterior calculus, to a set of differential equations and a tangent vector defining system transformations. Relationships between models using exterior calculus and conventional calculus imply a technical definition of dynamic equilibrium. Global Analysis of Composite Particles (III) uses differential topology to develop the theory of large vibration-rotation interactions for composite particles. A global classical Hamiltonian and corresponding quantum Hamiltonian operator are derived, then applied to the molecular vibration-rotation problem. Characteristic Electromagnetic and Yang-Mills Gauge (IV) uses differential geometry to remove some of the...

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