Special Issue

Noether's Theorem and Symmetry

Message from the Guest Editors

In Noether's original presentation of her celebrated theorm of 1918 allowance was made for the dependence of the coefficient functions of the differential operator which generated the infinitesimal transformation of the Action Integral upon the derivatives of the depenent variable(s), the so-called generalised, or dynamical, symmetries. A similar allowance is to be found in the variables of the boundary function, often termed a gauge function by those who have not read the original paper. This generality was lost after texts such as those of Courant and Hilbert or Lovelock and Rund confined attention to point transformations only. In recent decades this dimunition of the power of Noether's Theorem has been partly countered, in particular in the review of Sarlet and Cantrijn.

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Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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