Contribution ID: **190**   Type: **Oral (Non-Student) / orale (non-étudiant)**

The Enhancement of the Figure of Merit for Thermoelectric Materials

Tuesday 17 June 2014 17:00 (15 minutes)

There is substantial interest in enhancing the Figure of Merit of thermoelectric materials in their applications to diverse fields such as energy and environmental studies [1,2]. The relationship between thermal and electrical conductivities is often described by the empirical Wiedemann-Franz law.

Improvisations beyond this law have been found to be necessary to extend its scope to broader regimes. In the present work, we examine the roots of the extremization equations in thermoelectrics that result from optimization of the figure of merit using the polylogarithm functions of a complex variable [3].

Specifically, we study the roots of the Polylogarithms $Li_r(z)=0$ for arbitrary index r, which can be both real or complex. The solutions can be exploited to improve the Figure of Merit of thermoelectric materials, and also to propose a modification of the Wiedemann-Franz law based on our findings. The use of the polylogarithm functions for maximizing the Figure of Merit will provide a valuable approach that complements numerical solutions in the literature.

[1] Thermoelectric and thermomagnetic methods of energy conversion. Professor A.G. Samoylovich course of lectures - Chemivtsi: Ruta, 228 (2006).

[2] A.A. Snarskii, M.I. Zheinirovskii, and I.V. Bezsudnov http://arxiv.org/ftp/arxiv/papers/1109/1109.1585.pdf

[3] Muralikrishna Molli, K. Venkataramaniah, and S.R. Valluri, Can. J. Phys. 89: 1171-1178 (2011).

Primary author: Prof. VALLURI, Sree Ram (University of Western Ontario)

Co-authors: Dr DROZD, John (University of Western Ontario); Dr ROBERTS, Ken (University of Western Ontario); Prof. MOLLI, Muralikrishna (Sri Sathya Sai Institute of Higher Learning); Prof. DESHMUKH, Pranawa (Indian Institute of Technology, Madras, Chennai - 600036; Jain University, Bangalore - 560011, India.); Dr RAO, Shanthi (Jain University, Bangalore - 560011, India.); Prof. KAMISETTY, Venkataramaniah (Sri Sathya Sai Institute of Higher Learning)

Presenter: Prof. VALLURI, Sree Ram (University of Western Ontario)

Session Classification: (T3-6) Control of dynamical properties- DCMMP / Contrôle de propriétés dynamiques - DPMCM

Track Classification: Theoretical Physics / Physique théorique (DTP-DPT)