Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

About the prediction of Organic Rankine Cycles performances integrating local high-fidelity turbines simulation and uncertainties PIETRO CONGEDO, Inria Bordeaux, DANTE DE SANTIS, Stanford Univ, GIANLUCA GERACI, Stanford Univ and Inria Bordeaux — Organic Rankine Cycles (ORCs) are of key-importance when exploiting energy systems with a high efficiency. The variability of renewable heat sources makes more complex the global performance prediction of a cycle. The thermodynamic properties of the complex fluids used in the process are another source of uncertainty. The need for a predictive and robust simulation tool of ORCs remains strong. A high-order accurate Residual Distribution scheme has been recently developed for efficiently computing a turbine stage on unstructured grids, including advanced equations of state in order to take into account the complex fluids used in ORCs. Advantages in using high-order methods have been highlighted, in terms of number of degrees of freedom and computational time used, for computing the numerical solution with a greater accuracy compared to lower-order methods, even for shocked flows. The objective of this work is to quantify the numerical error with respect to the various sources of uncertainty of the ORC turbine, thus providing a very high-fidelity prediction in the coupled physical/stochastic space.

Dante De Santis
Stanford Univ

Date submitted: 02 Aug 2014 Electronic form version 1.4