Laudatio
John Todd Award 2013 for Dr. Markus Bachmayr

In 2008 Markus Bachmayr received his Master's degree in mathematics from the Johannes Kepler University in Linz. This work alread resulted in a publication on *iterative total variation schemes for nonlinear inverse problems*. Pursuing his doctoral studies at RWTH Aachen, he was funded by the Graduate School AICES and then became a reasearch assistant at the Institut für Geometrie und Praktische Mathematik. In a very independent manner he was able to learned the ropes of a totally different research topic and finished his PhD in 2012 with summa cum laude. To put this part of his scientific achievements into a proper perspective a few words on the subject are in order. In recent years problems in *high spatial dimensions* have been attracting a rapidly increasing attention. On the one hand, this interest stems form a variety of important and topical applications in science and technology. On the other hand, such problems pose an immense challenge to numerical simulation methodologies, due to the so called *"curse of dimensionality"*, which expresses the typically encountered fact that computational complexity grows exponentially in the spatial dimension. A major part of Markus Bachmayr's scientific work aims at breaking or at least significantly mitigating this "curse" for an important class of high dimensional problems such as, for instance, the electronic Schrödinger equation. Without trying to cover all facets, his contributions range from regularity analysis to highly complex implementations drawing from a variety of concepts such as wavelet methods, exponential sum approximations, and subspace based tensor methods. In particular, he has laid novel conceptual foundations for tackling the central question of *adaptively* unveiling a hidden *tensor sparsity* of solutions. These contributions not only reflect an impressive level of technical skills but exhibt a stunning degree of conceptua novelty. The corresponding complex of results culminate in the design and analysis of an algorithm that produces low rank tensor approximations to solutions of high dimensional elliptic operator equations with the following poperties. The scheme exhibits in some sense rigorously proven optimal complexity in terms of tensor ranks, sparsity of the tensor factors, as well as computational work. This seems to be the first result of this type ever which certainly will open a number of exciting future research perspectives.