



BOOK REVIEW

Integrable Hamiltonian Hierarchies, Spectral and Geometric Methods, by Vladimir Gerdjikov, Gaetano Vilasi and Alexandar Yanovski, Springer, Heidelberg 2010, 643 pp., ISBN: 978-3-642-09577-1.

In the past decades there has been significant progress in the theory of the non-linear evolution equations that could be solved through some inverse scattering techniques (soliton equations or completely integrable equations). These equations have many applications to various physical theories (both classical and quantum) such as hydrodynamics, plasma physics, nonlinear optics, solid state physics etc. Their study also boosted the mathematical research in Hamiltonian dynamics and more generally in the theory of the dynamical systems and in the spectral theory of operators. The mentioned progress, together with interesting applications, increased the number of research monographs dedicated to the subject of soliton equations. The variety of approaches used in these monographs reflects the variety of the methods used in the study of the soliton equations. In general however, most of them are dedicated to the development of one particular approach and the interrelations with other approaches and ideas frequently remains obscure.

The book under review is one of the few exceptions. It develops in parallel spectral and geometric methods to the topic and also encompasses many algebraic ideas related to these fields. The first edition has been published in 2008, by the same publisher. The appearance of this soft cover reprint shows that the readers appreciated the integral approach of the book and that the topic itself remains popular.

The book has two parts: I) Spectral Theory of the Recursion Operators and II) Geometry of the Recursion Operators, treating the so-called Recursion Operators (also known as generating operators or Λ -operators) from spectral and geometric viewpoint respectively. The recursion operators are one of the essential tools of the soliton equations theory, in fact their study reveals almost everything related to the soliton equations except the exact solutions. Finding the exact solutions requires other techniques which are also treated in the book. The authors contributed to the development of both aspects of the recursion operator theory, discussed in