The current special issue is the indirect result of the Sixth Workshop on Graph Classes, Optimization, and Width Parameters, GROW, held in Santorini, Greece, in October 2013. It is a successor to the following special issues of Discrete Applied Mathematics: 168 (2014) dedicated to GROW 2011, held in Daejeon, South Korea; 160-6 (2012) dedicated to GROW 2009, held in Bergen, Norway; 158-7 (2010) dedicated to GROW 2007, held in Eugene, Oregon; 157-12 (2009) dedicated to the second workshop in the series, held in 2005 in Prague, Czech Republic; 145-2 (2005) dedicated to the first workshop, held in 2001 in Barcelona, Spain; and 54-2/3 (1994) dedicated to a workshop held in 1989 in Eugene, which in retrospect we view as workshop number zero in what has evolved to become the successful bi-annual GROW workshop series.

This issue comprises 14 papers authored mainly, but not exclusively, by participants of the workshop. All submissions have been carefully refereed, and we thank all the referees for their hard work. True to the name of the workshop, the papers in the current special issue report on investigations in three areas of research: Graph classes, Optimization, and Width parameters. Due to the close interconnections among these areas, most of the papers fit into more than one of them. Based on their main focus, we introduce the papers in this issue in the corresponding three groups.

The area of Graph Classes is represented by papers proving new structural properties of various graph classes and exploring algorithmic consequences of these properties. Bonomo, Grippo, Milanič, and Safe initiate the study of graph classes of power-bounded clique-width and give sufficient and necessary conditions for this property. Brignall, Lozin, and Stacho study bichain graphs that are a bipartite analog of split permutation graphs. They show that these graphs admit a simple geometric representation and have a universal element of quadratic order. Golovach, Heggernes, Kanté, Kratsch, and Villanger show that all minimal dominating sets of a chordal bipartite graph can be generated in incremental polynomial, hence output polynomial, time. Konagaya, Otachi, and Uehara present a polynomial-time algorithm for the subgraph isomorphism problem on several subclasses of perfect graphs. Mertzios and Zaks study acyclicity in the intersection of tolerance and cocomparability graphs that coincides with bounded tolerance graphs. They prove the conjecture for every graph that admits a tolerance representation with exactly one unbounded vertex.

The Optimization section consists of papers that study computational complexity and algorithmic issues of various optimization problems on graphs. Corneil, Dusart, Habib, Mancarz, and de Montgolfier consider the problem of the recognition of various kinds of orderings produced by graph searches. To this aim, they introduce a new framework in order to handle a broad variety of
searches. Crescenzi, Fraigniaud, Halldórsson, Harutyunyan, Pierucci, Pietracaprina, and Pucci study the shortest-path broadcast problem in graphs and digraphs, where a message has to be transmitted from a source node to other nodes along shortest paths. Panda and Pandey consider the problem of computing a total outer-connected dominating set of minimum cardinality of a given graph. For this problem, they provide several hardness results and polynomial-time algorithms on special graph classes. Shalom, Wong, and Zaks examine on-line versions of the maximum matching problem, and they provide some applications on wavelength assignment problems on optical networks. Xiao and Nagamochi present a $1.1736^nn^{O(1)}$-time exact algorithm for the maximum independent set problem on an $n$-vertex of maximum degree at most 5.

Papers in the section on Width Parameters consider interplay between the algorithmic treatment and width parameters of input graphs. Bian, Gu, and Zhu report on the practical performance of several algorithms computing the branchwidth or branch-decomposition of planar graphs and several heuristics for improving these algorithms. Cechlárová, Polpíková, and Schlotter investigate the complexity of the sports elimination problem using a multivariate approach to examine how various parameters of the input graph influence the computational tractability. Engelmann, Ordyniak, and Kreutzer study the concept of elimination-width on digraphs from an algorithmic and graph searching perspective. Hartstein, Shalom, and Zaks investigate the parameterized complexity of two variants of the regenerator location problem in optical networks.

The topics discussed in this issue represent an active and vibrant research area of contemporary graph theory. The Seventh Workshop on Graph Classes, Optimization, and Width Parameters, GROW 2015, is going to be held in October, 2015, in Aussois, France.

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