EDITORIAL

It was a great pleasure to be asked by Professor Neculai Andrei to be a guest editor for this special issue of *Advanced Modeling and Optimization* which marks ten years of publication. Since 1999, the journal has proved itself to be a truly international one, featuring papers on a wide range of subjects by authors from many countries, including Algeria, Bulgaria, China, Great Britain, India and the United States (to name only a few). This special issue of *AMO* further extends that range by including authors from England, Oman, Italy and New Zealand. It is a particular pleasure to recall that the two New Zealand submissions arose because of contacts made during my enjoyable and rewarding time as an Erskine Fellow at the University of Canterbury, Christchurch between February and April 2008.

The theme for this special issue is Unconstrained Optimization. It may be the case that constrained problems receive more attention in the literature these days. But unconstrained minimization has for a long time generated key ideas which have subsequently fed into solution methods for problems with constraints – for instance, the use of quasi-Newton estimates of Hessian matrices and the trust-region approach for dealing with non-convexity. Moreover, in practice, some constrained problems are still tackled by converting them to unconstrained ones – as in the penalty function or reduced-gradient techniques. Therefore we can still expect that widely useful algorithmic proposals will emerge from the study of the unconstrained problem.

The five papers in this issue deal with various aspects of unconstrained minimization and take account of different types of problem. Beddiaf considers the situation where exact second derivatives are available and proposes a method for traversing non-convex regions using a mixture of trust-region and trajectory-following techniques. Christianson looks at the line-search phase in a minimization algorithm and points out an aspect of the original Armijo technique which seems to to have been overlooked in recent years. He shows (with particular reference to a truncated Newton algorithm) that this feature may be exploited to make methods more efficient in their use of function evaluations. The paper of Al-Baali & Grandinetti relates to methods which use only first derivatives and reports some experience of using modified forms of the BFGS quasi-Newton update when the usual condition for retaining positive-definiteness does not hold. Quasi-Newton methods are also considered by Coope & Hutchinson who propose a class of updating strategies for the case when only function values (rather than gradient information) is available. This work rests on an implicit assumption that the objective function is continuously differentiable; but the final contribution from Price, Robertson & Reale describes a direct search algorithm capable of dealing not only with the non-smooth problem but also one where the function itself is discontinuous.

To varying degrees, the papers in this special issue describe work which is still in its preliminary stages. We can therefore look forward to seeing further theoretical

and algorithmic developments and applications to more challenging problems. In the meantime, I hope readers will find these papers interesting and informative and indeed that the high quality of the contributions to this issue will help to cause the readership of *AMO* to continue to increase as the journal enters its second decade.

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