

Naumann, Uwe; Riehme, Jan

Computing adjoints with the NAGWare Fortran 95 compiler. (English) Zbl 1270.65090

Bücker, Martin (ed.) et al., Automatic differentiation: Applications, theory, and implementations. Selected papers based on the presentation at the 4th international conference on automatic differentiation (AD), Chicago, IL, USA, July 20–23, 2004. Berlin: Springer (ISBN 3-540-28403-6/pbk). Lecture Notes in Computational Science and Engineering 50, 159-169 (2006).

Summary: We present a new experimental version of the differentiation-enabled NAGWare Fortran 95 compiler (from now on referred to as “the AD compiler”) that provides support for the computation of adjoints in the reverse mode of automatic differentiation (AD). Our implementation uses split program reversal in conjunction with a stack of gradients of all assignments executed inside the active section. Two papers describe the modifications of the compiler infrastructure that were required to provide forward-mode AD capabilities. The reverse mode presented in this paper makes extensive use of these features.

Special emphasis is put on the presentation of the new user interface that provides a very easy and intuitive way for initiating derivative computations as well as for addressing the results. Various language extensions are introduced for this purpose. The compiler front-end is modified to accept these new constructs syntactically and semantically. The use of the language extensions triggers the automatic generation of derivative codes of various kinds by the compiler.

For the entire collection see [[Zbl 1084.65002](#)].

MSC:

[65Y99](#) Computer aspects of numerical algorithms

Cited in **3** Documents

Keywords:

[AD compiler](#); [reverse mode](#); [preaccumulation](#); [taping](#); [CompAD](#)

Software:

[CompAD](#); [NAGWare](#); [TAF](#); [TAPENADE](#)