Abstracts of IWANASP, October 22 – 24, 2015, Lagos, Portugal

CONSTRUCTION OF IMPLICIT-EXPLICIT DIMSIMS OF HIGH ORDER

ZDZISLAW JACKIEWICZ

School of Mathematical & Statistical Sciences

Arizona State University, Tempe, Arizona 85287, USA

E-mail: jackiewicz@asu.edu

For many systems of differential equations modeling problems in science and engineering, there are often natural splittings of the right hand side into two parts, one of which is non-stiff or mildly stiff, and the other part is stiff. Such systems can be efficiently treated by a class of implicit-explicit (IMEX) diagonally implicit multistage integration methods (DIMSIMs), where the stiff part is integrated by implicit formula, and the non-stiff part is integrated by an explicit formula. We analyze stability of these methods when the implicit and explicit parts interact with each other. We look for methods with large absolute stability region, assuming that the implicit part of the method is $A(\alpha)$-, A-, or L-stable. Finally we furnish examples of IMEX DIMSIMs of order $p = 5$ and $p = 6$ with good stability properties. (This is a joint work with Hans Mittelmann).