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AUTOMATIC VERIFICATION OF ALGORITHMICALLY DIFFERENTIATED CODE

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Algorithmic differentiation (AD) has become indispensable for several CFD codes. The present work introduces an automatic verification toolbox. There are several available verification strategies for AD code, such as comparison with finite differences (as seen in [1]) and duality tests, which are nowadays executed with "hand calculations" or semi-automatic scripts. The goal of the present work is to improve global automation by introducing a fully automatic verification step that checks AD code (tangent and adjoint modes) directly after its generation.

There are two different AD approaches known as Source Transformation (ST) and Operator Overload (OO). While OO is considered as an appropriate choice in the context of object oriented definitions [2, 3], ST has been proven more efficient for recent HPC applications for adjoint computations [4, 5]. Hence, we focus on the ST-based AD tool Tapenade for tangent and adjoint source code generation, which we automate similarly to [6]. In this talk we present state of the art approaches for verification strategies (as mentioned above), which are of great intererest in the context of optimisation problems such as shape optimization in aerodynamics applications [7].

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