

GOING IMPLICIT: LARGE TIME STEPS FOR HYPERBOLIC PROBLEMS

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I will discuss the construction of implicit schemes in hyperbolic problems, especially in the low Mach case. I will consider two different procedures. First, implicit schemes can be derived to target some specific speeds, neglecting faster phenomena. This is the realm of low Mach schemes, where the purpose is to trace convective flow, while preserving the incompressible limit. I will discuss the main issues and difficulties in the numerical treatment of these problems and present an approach based on relaxation for hyperbolic systems for elastic models and two-phase flow. A second approach is to construct fully implicit schemes. Here the difficulty lies in the high non linearity of non oscillatory high order schemes.