# MFC: An open-source high-order multi-component, multi-phase, bubbly flow solver

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We present the `MFC`, an open-source tool for solving multi-component, multi-phase, and bubbly flows.

## PROGRAM SUMMARY

*Title of program:* MFC (Multicomponent Flow Code)
*Permanent link to code/repository:*
*Operating systems under which the program has been tested:* UNIX, Mac OSX, Windows
*Programming language used:* Fortran 90 and Python
*Memory required to execute with typical data:* Application dependent
*Number of processors used:* 1 or more, determined by user

## I. INTRODUCTION

- Multiphase/component and bubbly flows, why important, what applications

- Intro to model and numerics methodology

- What MFC is (acronym as well)

Multiphase flows, such as the liquid/gas case we consider herein, and multicomponent configurations that include gases or liquids with different physical properties flows are commonplace in engineering applications.

## II. OVERVIEW AND FEATURES

- The package and what it includes

- Features. Parallel, Riemann solvers, THINC, WENO, additional physics, etc.

- Description of input/output files

- Structure of the code.

- How to run

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## III.   DATA STRUCTURES

- Cartesian data structures / cylindrical meshes

- How parallel data are broken down

## IV.   NUMERICS

- Finite volume for conservation laws

- Treatment of non conservative terms

- Additional physics

- Source term integration

- Bubbly flow terms

- Physical relaxation

## V.   SIMULATION TEST CASES

The abilities are demonstrated via a few test cases.

- Bubble collapse

- Bubble screen

- Shock-bubble interaction

- Droplet (Jomela)

- Bubble in vessel (Vedran)

- 3D bubble net

- etc.

## VI.   CONCLUSIONS