

2nd International Conference and Exhibition on **Mechanical & Aerospace Engineering** September 08-10, 2014 Hilton Philadelphia Airport, USA

Virtual mass effects of submerged bodies in flowing liquids

Abdullah Abbas Kendoush
Augusta Technical College, USA

When a body accelerates in a fluid, an additional force to the drag and buoyancy must be added to the general equation of the conservation of momentum for that body. This force takes the following form $(C_m \rho V du/dt)$ where C_m is the virtual mass coefficient, ρ is the density of fluid, V is the volume of the body, and du/dt is its acceleration. Everybody should have its unique value of C_m , so for a constant-volume spherical body (solid or fluid) $C_m = 1/2$. The present author derived the following equation for the C_m of the ellipsoidal bubble

$$C_m = \{2[1 - 0.103We^2]^3[1 + 0.093We^2]^2[1 - 0.1875We^2]\}^{-1}$$

Here We is the Weber number. As $We \rightarrow 0$ (the case of the spherical bubble); $C_m \rightarrow 1/2$. The spherical-cap bubble has also its own value of C_m , that was shown by the author to be a function of the eccentricity, which is defined as the ratio of the width to height of the spherical-cap bubble. A value of 5 was found for the C_m of the rotating spherical particle in fluids. One of the main outcomes of the inclusion of the C_m into the numerical solution of the general equation of the conservation of momentum, is that the numerical solution of this equation converges without numerical instability. The of a growing and collapsing bubble were derived by the author. The solution was validated by their asymptotic approach to the limit of the single constant-volume bubble. During the author's stay at Georgia Tech, a new value for the C_m was obtained.

Biography

Abdullah Abbas Kendoush has completed his PhD at the age of 30 years from Strathclyde University (UK). He was Head of Department of Nuclear Reactor Physics at the Iraqi Atomic Energy. He was the Manager of the Engineering Physics Center of the Ministry of Science and Technology in Baghdad. He finished Postdoctoral studies from Florida University Department of Mechanical and Aerospace Engineering. He also completed Postdoctoral studies at the Department of Biomedical Engineering of Georgia Institute of Technology. He has published more than 50 papers in reputed journals and serving as an editorial board member of a number of international journals.

akendoush@augustatech.edu