NASA Honor Award (Individual) Details

Award Title:
Exceptional Technology Achievement Medal

Name of Nominee:	Nominee's Organization:
RAJAGOPALAN, R GANESH	AUA
Award Amount:	Funding Organization: A/AV

Charge Code Information:

Citation:
For the innovative development and application of a conceptual design aerodynamic analysis tool for next-generation vertical lift aircraft.

Justification:
Dr. Ganesh Rajagopalan has developed the most widely distributed and validated, workstation-based computational fluid dynamics (CFD) simulation code for rotorcraft. The well documented CFD code Rotorcraft Computational Fluid Dynamics (RotCFD), developed in close collaboration with NASA Ames rotorcraft researchers over the past decade, has become an exceptionally effective analysis tool for the conceptual and preliminary design of vertical lift aircraft due to its efficient and robust modeling of rotor system aerodynamics and the wake generated by the rotor system. It has been used for a number of NASA research projects and is currently an important tool in the NASA Revolutionary Vertical Lift (RVLT) Project Technical Challenge, the Multidisciplinary Design and Analysis (MDAO) for Vertical Lift Vehicles, which is led by NASA Ames Research Center. The RotCFD simulation code provides physics-based engineering accuracy using Navier-Stokes fluids modeling. It includes modeling of multiple and different size rotor systems, modeling of aircraft component and full airframes, as well as the modeling of surrounding structures and the ground surface, if desired. The code was specifically developed to be user-friendly and have a short learning curve. It can be hosted on a common workstation and has become a primary CFD tool for the industry for modeling rotor systems for any type of vertical lift aircraft, including helicopters, tiltrotor aircraft, personal air vehicles, unmanned aerial vehicles, and quadcopters. The code is heavily used at NASA Ames and Langley Research Centers, and by the U.S. Army Aviation Development Directorate, industry, and domestic and international universities. Recent applications of the code at NASA Ames include new vertical lift aircraft design space experiments, large civil tiltrotor aircraft operations around airport terminals, potential aerodynamic flow quality improvements through modifications to the National Full-Scale Aerodynamics Complex (NFAC) at Ames, and wind tunnel wall corrections to rotorcraft tests performed in the 7- by 10-Foot Wind Tunnel and the NFAC. The RotCFD code has opened the world of CFD to nearly 100 NASA Ames aeromechanics interns over the past 5 years due to the comprehensive code tutorials, clear documentation, graphical user interface, and ease of use. Interns are able to master code usage quickly and make contributions to current areas of rotorcraft research in the NASA vertical lift research portfolio during their ten-week program. The RotCFD projects from the Summer 2016 Intern program included: analysis and evaluation of the Elytron Aircraft 4S personal vertical lift aircraft; correlation with the Large Civil Tilt Rotor test results from the Ames 7x10 wind tunnel test; evaluation of the 80x120 test section for model helicopter rotor hover testing; analysis of the effect on flow quality of the acoustic microphone rail installation in the 40x80 test section; pretest predictions for the AW 609 rotor on the Tiltrotor Test Rig; and the AH-56 hub drag correlation study using the recent 7x10 test results for five different test configurations, the results of which have been published. Several Masters theses have been executed at NASA Ames using RotCFD during time-limited internships, and RotCFD is now being used at six universities (UC Berkeley, Georgia Tech, University of Illinois, Iowa State, Missouri University, and the University of Utah) as former Ames interns have returned to their schools and are now using the code for their projects and graduate studies. Dr. Rajagopalan's game-changing technology has advanced the accessibility of efficient physics modeling, utilizing the ever increasing computational capability and memory of workstation hardware, in order to meet the ever growing need for technology that will address critical NASA research challenges. The NASA Spinoff 2017 article title (pps. 62-63) sums up the accomplishment "Software Opens Computational Fluid Dynamics to the Uninitiated". For his technical achievements and for the hundreds of NASA Ames university interns he inspired, Dr. Rajagopalan genuinely deserves this recognition for his exceptional technology achievement in development and use of RotCFD.

Comments:

Initiator:	Nominator:	Approver:	Effective Date:
WARMBRODT, WILLIAM	WARMBRODT, WILLIAM	QUINN, CHERYL	02/14/2017
Date Created:	Reviewer:	Approval Date:	Current Status:
12/07/2016	NONE REQUIRED	02/10/2017	PENDING NASA RECORDER