University of Michigan, IBM team up on computer project

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A new collaboration between the University of Michigan and IBM will help scientists and engineers run computer simulations faster than they have been able to previously, with applications ranging from predicting climate change to designing aircraft wings to studying the origins of the universe.

"Simulations are driving science, and we are trying to make it very efficient," Karthik Duraisamy, assistant professor in the university's Department of Aerospace Engineering and director of the university's Center for Data-Driven Computational Physics, told the Detroit Free Press.

The new program was announced Wednesday.

IBM and Michigan researchers have designed a new computing resource called ConFlux that will allow computing clusters to work better with data-intensive simulations. IBM is providing servers and software for the program.

Here's how the new system will help Duraisamy, an aerospace engineer:

If he is working on designing a new aircraft wing, it can take a long time - possibly years - to run all the simulations. That's because the computer has to use not only massive piles of data but also the laws of physics.

"This will allow us to speed up the whole design process," Duraisamy

said.

As one of the first projects Michigan will undertake with its advanced supercomputing system, researchers are working with NASA to use cognitive techniques to simulate turbulence around aircraft and rocket engines. They're combining large amounts of data from wind-tunnel experiments and simulations to build computing models that are used to predict the aerodynamics around new configurations of an aircraft wing or engine. With ConFlux, Michigan can more accurately model and study turbulence, helping to speed development of more efficient airplane designs. It will also improve weather forecasting, climate science and other fields that involve the flow of liquids or gases.

Michigan is also studying cardiovascular disease for the National Institutes of Health. By combining noninvasive imaging such as results from MRI and CT scans with a physical model of blood flow, Michigan hopes to help doctors estimate artery stiffness within an hour of a scan, serving as an early predictor of diseases such as hypertension.

Studies are also planned to better understand climate science such as how clouds interact with atmospheric circulation, the origins of the universe and stellar evolution, and predictions of the behavior of biologically inspired materials, the university said in a press release.