been awarded to the Texas Trans-

the research is being conducted

under an interagency agreement

Coordination of the Office of the

Texas Aeronautics Commission.

TTI's contract is part of a

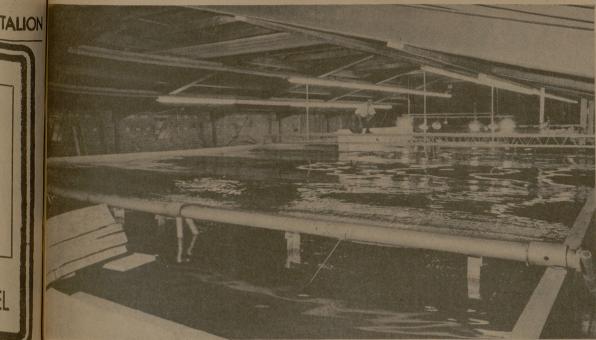
\$419,974 grant from the Federal

Aviation Administration of the

the state. It is supplemented by

Jack Keese, TTI director, said

portation Institute.



Dr. John B. Herbich look over a dredging systems model used in tests at the three-

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THE GRADUATE COLLEGE Final Examination for the Doctoral Degree Name: Chitwood, Jack Roy Degree: Ph.D. in Civil Engineering Dissertation: COMPUTER MODEL OF LOW-FLOW ROUTING FOR THE BRAZOS RIVER.

Time: June 1, 1971 at 1:00 p.m.

Place: Room 104 in the Hydromechanics Lab.

George W. Kunze Dean of the Graduate College

THE GRADUATE COLLEGE June 7, 1971 at 1:30 p.m. Room 313 B in the Biological Sci-Bldg.

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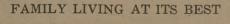
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Tank will allow THE BATTALION simulation of Texas air plan study continued 21-foot waves

Simulation of up to 21-foot ocean waves, currents of up to two knots and wave lengths of up to 500 feet are now available in a three-dimensional wave-sediment basin here.

"We have the only wave tank of any magnitude in the South and Southwest," said Dr. John B. Herbich, head of the Civil Engineering Department's Coastal and Ocean Engineering Division.

The 32-foot by 86-foot by 2.5foot basin is located in the university's Hydromechanics Laboratories next to the new \$9 million Engineering Center.

Recently place in operation, the tank will be used to perform harbor and estuary model studies, littoral drift and erosion.

Currently, Herbich's staff is running a model study of offshore dredging systems.

Funding for the basin came from Chicage Bridge and Iron Co. It contains tide and portable wave generators and water supply lines to generate the currents.

The tank holds approximately 41,170 gallons of water, Herbich said.

Texas A&M began its coastal and ocean engineering program in 1968 at the graduate level, and Herbich said an undergraduate program will begin within two

The first research paper from the wave tank program was presented last month at the Offshore Technology Conference in Hous-

Brazos EAC sets forum Thursday

The Environmental Action Council of Brazos County will present a forum titled "Development of local flood plains" Thursday at 8 p.m. in the Bryan Public Library auditorium for all interested citizens.

A series of talks and film presentations concerning aspects of urban water management will be presented, publicity director Warren E. Finn said. transportation plan for Texas has ment of a comprehensive statewide airport system. The work is to be done over a 27-month period.

The TTI research is for Phase II work which involves the drafting of an airport system plan and with the Division of Planning will include an inventory of existing airports, their usage, and an Governor in cooperation with the analysis of future needs. The study will forecast future aircraft demand and provide an examination of passenger and cargo needs in the state. Department of Transportation to

It also will establish an airport service.

A \$385,118 contract for con- the state for an estimated \$630,- system plan for Texas that intinued research to develop an air 000 to cover the further develop- corporates inputs from other regional systems plans as they are developed.

> The air mode is seen as an important element in over-all transportation planning for continued development of market areas, movement of goods and people, and communication throughout the state, Keese said. It is recognized also for its major impact on the fast-growing metropolitan areas of the state where commercial carriers provide inter-city

Student explains danger wave refraction and diffraction problems and coastal sediment littoral drift and erosion. of wing-generated twisters?

off wing tips of in-flight airplanes and a 20-foot tower revealed the are becoming dangerous.

All aircraft produce wing tip vortices, a Texas A&M student notes, but the spiraling columns of air generated by big airplanes such as the Boeing 747, the French Concord and Russia's TU-144 are vicious.

Carlos M. Barrera said in a study of the phenomena that the big planes leave behind "twisters" which pose a distince danger to smaller following aircraft. Structural failure and life loss are possible.

"Giants such as the Concord and B-70 have vortex velocities as high as one and a half to two times the flight speed of light planes," the areospace engineering major from San Antonio re-

Barrera noted in a report to Dr. C. A. Rodenberger that Federal Aviation Administration officials are trying to make general aviation pilots aware of the presence and danger of the vortices, and how to avoid them.

Barrera worked in a Texas A&M Flight Mechanics Laboratory experiment to learn more about wing tip vortices. Investigation conducted by Dr. W. P. Jones and Dr. B. M. Rao made the vortices visible and measurable. Smoke bombs attached to

Miniature tornadoes which shed the wings of a Beechcraft T-34 landing and taking off lie over air flow as a sinusoidal (a continuous "S" shaped) curve.

As the curve dissipated in calm air, puffs of smoke marking individual air swirls formed at regular intervals, Barrera said. They lingered over the runway 20 to 30 seconds. If the bottom of the curve touched the runway, it broke up quickly.

Barrera, who completed his aero engineering studies this spring, noted that FAA reports "vortices formed at 30,000 feet where airliners cruise remain intact, complete with high velocity winds around the core of the vortex."

They fall at 500 feet per minute and level off 700 to 900 feet below and behind the generating plane's flight path. The vortices caused by the 747 may be 60 feet in diameter and encountered 35 miles behind the aircraft that caused them. As one form of clear air turbulence (CAT), they can cause structural damage to planes flying through them.

Vortices produced by big planes duce vortex strength.

the runway. Some have taken 160 seconds to clear out.

The phenomenom is caused by the slightly arched airplane wing, designed to create lift by generating lower pressure on the upper surface as the wing moves through the air.

"Pressure differences between the top and bottom of the wing disappear gradually toward the wing tip," explained Barrera, a San Antonio Highlands High School graduate. "These pressures do not match at the tips, causing a flow of air from the bottom to the top-from greater pressure to lower pressure. Because the wing is moving forward, this tip air flow is shed as vortices."

Barrera offered three solutions Heavy vortex generators might be restricted to flying certain zones and special airports. Or, wing loading restrictions might be placed on future aircraft construction, limiting their size. He said it might be possible to design an airfoil which would re-



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