Jiangsu University of Science and Technology

Master thesis proposal:
DEVELOPMENT OF AUTONOMOUS UNDERWATER VEHICLE FORWARD VELOCITY CONTROLLER

Major: Control Science and Engineering
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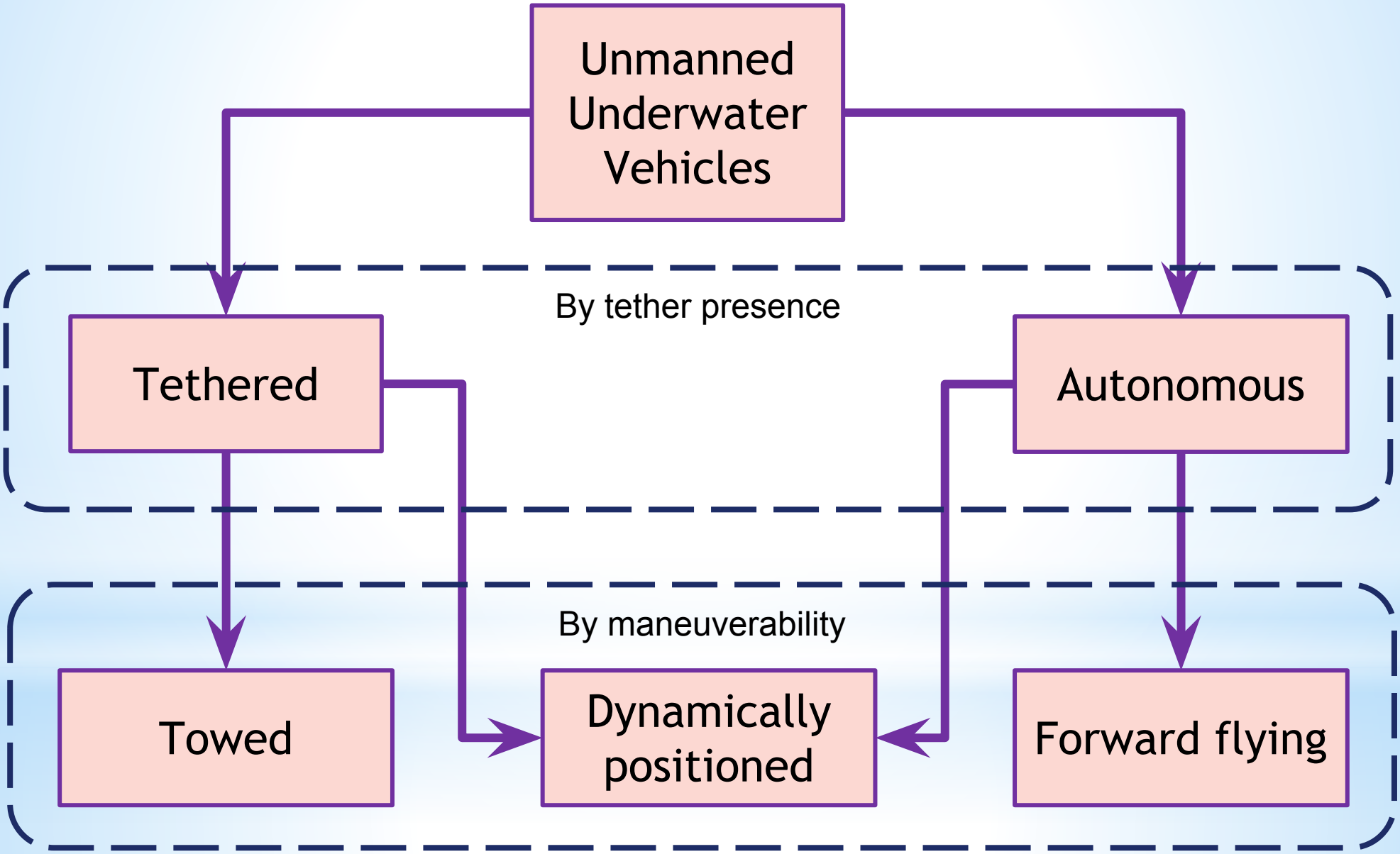
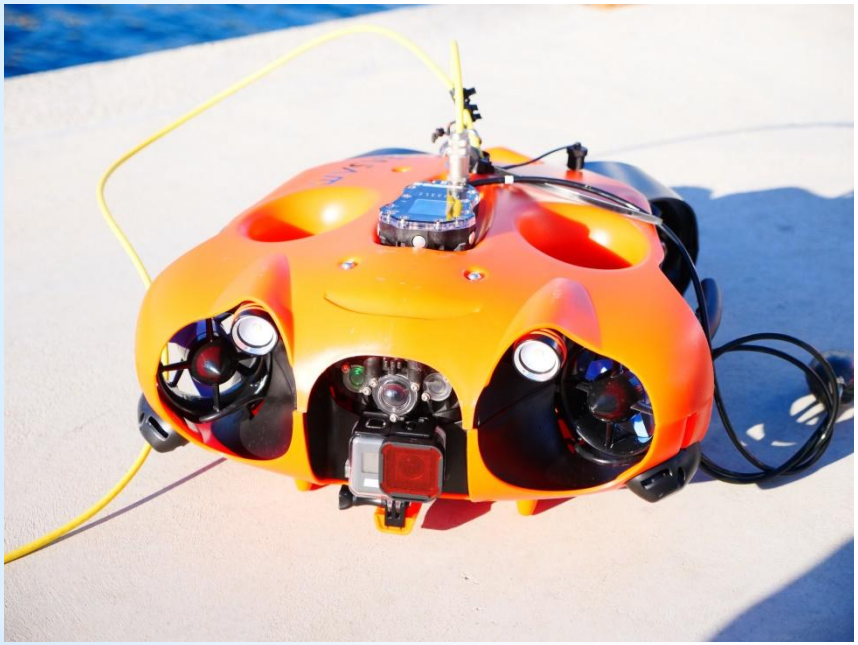
Research direction: AUV control
Supervisor: Dr. Zhu Zhiyu

UNMANNED UNDERWATER VEHICLES CLASSIFICATION



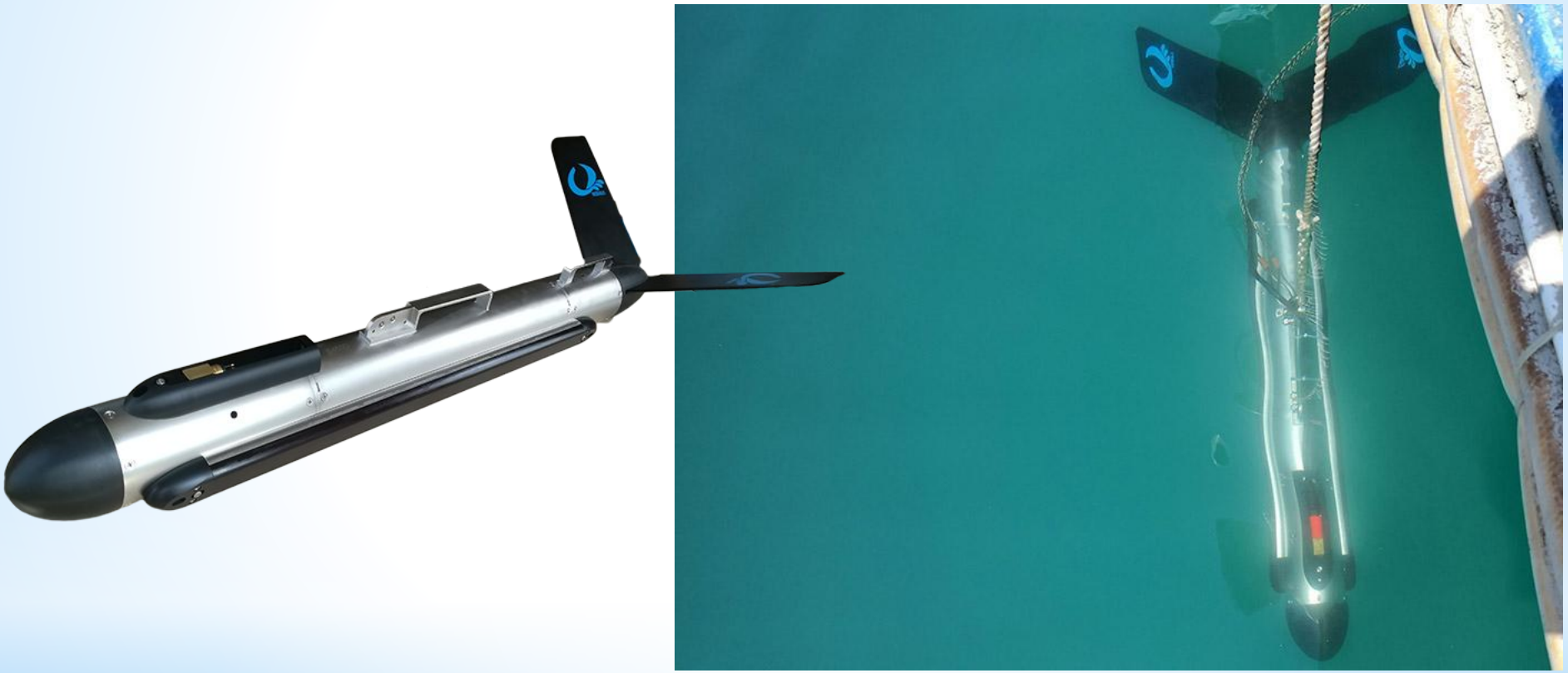
REMOTELY OPERATED VEHICLES (DYNAMICALLY POSITIONED) EXAMPLES



Seasam ROV

Saab Seaeye's Falcon

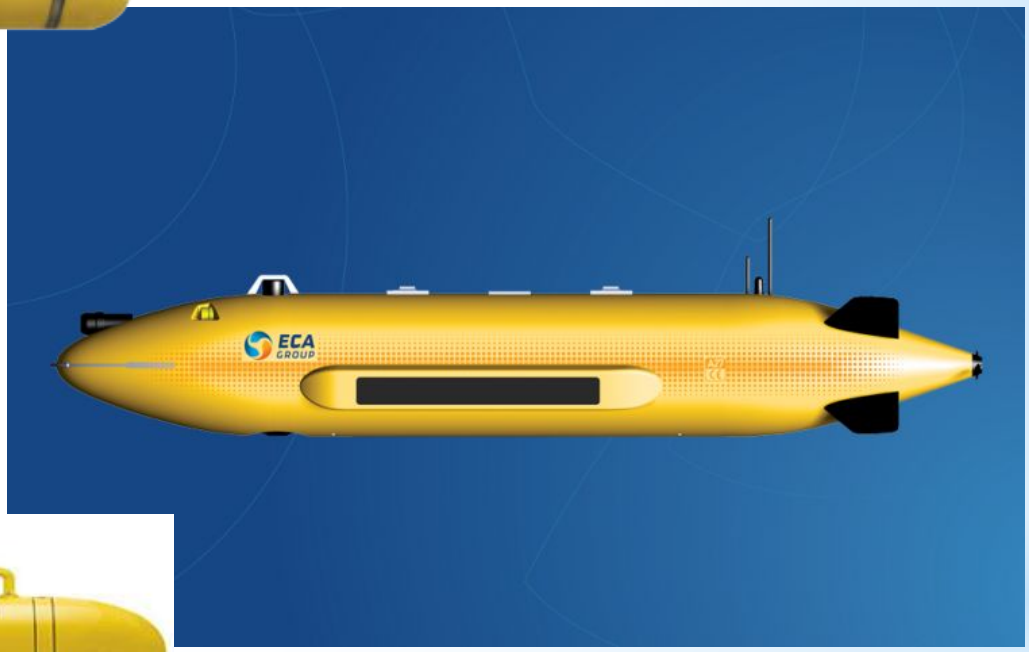
TOWED UNDERWATER VEHICLES
EXAMPLE



TUV – Shark-S450D

AUTONOMOUS UNDERWATER VEHICLES (FORWARD FLYING) EXAMPLES

Bluefin-21



ECA Group AUV: A27-M

Remus-100

OBJECT OF RESEARCH

Autonomous underwater vehicle:

- forward flying
- neutrally buoyant
- carry their own power source
- carry their own computer unit, running software
- has control solutions that allow the execution of a mission without human intervention

Modern ways of AUV control (based on literature review)

Executive level control:

- fuzzy control
- slide mode control
- neural network control
- the backstepping control
- PID-control

Path planning:

- preprogrammed sequences of waypoints
- tracklines
- semi-autonomous mission management

AIM AND TASKS OF THE THESIS

AUV main regime:
forward motion, which is basic to perform yaw and pitch motion

AUV controller implementation:
software by means of onboard computer

AUV motion condition:
under disturbances

The aim of the thesis: synthesis of forward motion
PID-like-controller with disturbances compensation for the AUV

Tasks of the thesis:
- develop the simulating model of forward motion of an AUV;
- synthesize the AUV forward motion controller with disturbances compensation;
- research the controller using the developed AUV simulating model.

METHODS TO SOLVE THE TASKS

To fulfill the set of tasks and achieve the given aim the following methods are to be used:

- the methods of classical hydromechanics theory to develop the AUV model;
- the methods of numerical solving the differential equations to perform the AUV motion simulation process;
- the method of computer simulation;
- the method of PID-controller synthesis;
- the method of disturbances compensation.

THANK YOU
FOR YOUR ATTENTION!