The "Fast Stability" computer program used for training in maritime schools

Żaneta Cepowska[1], Tomasz Cepowski[2]

[1] Society for the Promotion of Knowledge of Marine
 70-500 Szczecin, ul. Wały Chrobrego 1–2, e-mail: psm@szkolamorska.pl
[2] Maritime University of Szczecin
 70-500 Szczecin, ul. Wały Chrobrego 1–2, e-mail: t.cepowski@am.szczecin.pl

Key words: education, exam, program, e-learning, maritime school

Abstract

This paper presents computer software "FastStability". The software has been developed for all kind of vessels and calculates stability with many additional options. The "Fast Stability" program is used in Post-Secondary Maritime School in Szczecin in education purpose.

Introduction

Society for the Promotion of Knowledge of Marine, as the body leading secondary school in the Maritime, is a non-governmental social organization. The activities started in 1995, and in 2005 was entered into the National Court Register under the number 0000061904. The purpose of the Society is to support educational initiatives in favor of the maritime economy [1].

This objective Society accomplishes by [1]:
organizing the Post-Secondary Maritime School in Szczecin,

− organizing courses, lectures, seminars and other forms of education for children and adults;
− cooperation with local governments, public administration, schools, academic institutions in particular, the Maritime Academy in Szczecin;
− cooperation with domestic and foreign organizations engaged in similar activities.

Post-Secondary Maritime School in Szczecin, enables young people to achieve in a short period of about three years, diplomas and professional officer, capable of working on ships around the world. The school is for young people who graduated from high school or technical school final exams or not. The school prepares students to work in the deck department on vessels and marine engineering, preparing for the exam for diploma officer

of the watch, it opens the way for further advancement [1, 2].

A graduate of the College for Maritime has full authority to apply for a certificate merchant navy officer on watch after passing the examination before the Examination Committee of the Maritime Office, which allows for employment in this position on maritime vessels domestic and foreign shipowners [1, 2].

Education in Post-Secondary Maritime School in Szczecin is currently implemented for the following [1, 2]:

− techniques navigator marine;
− technician engineer.

The curriculum specialties Navigator Marine Technician training meets the requirements in accordance with [3, 4] of support and operational. After completing the first year of study and completion of two months of practice students can apply for a certificate Mariner watch. However, after completing his studies in Post-Secondary School of Marine and serving 12 months of practice graduates can apply for a Diploma officer of the watch [1, 4, 5].

The curriculum specialty engineer technician training meets the requirements in accordance with the requirements of the STCW Convention and the operating subsidiary level. After completing the

first year of study and completion of two months of practice students can apply for a certificate of engine assistant. However, after completing his studies in Post-Secondary School of Marine and serving six months of practice graduates can apply for a diploma engineer officer on watch [1, 2].

The Post-Secondary Maritime School as well as other units of teaching trainees sailors, there are problems related to the implementation and monitoring of the learning process [1, 2]:

− the need to maintain a high level of education;
− the need to develop the knowledge and practical skills;
− prepare students for examination before the Central Examination (according to [5]);
− the need to archive test results for the checks carried out by the maritime administration offices.

In order to solve these problems in Post-Secondary Maritime School in Szczecin is used and implemented computer software for control stability called "Fast Stability".

The computer software "FastStability"

The FastStability software has been developed for all kind of vessels and calculates stability with many additional options:

− Change of ship characteristics;
− Planning of loading, discharge, reserve and balance;
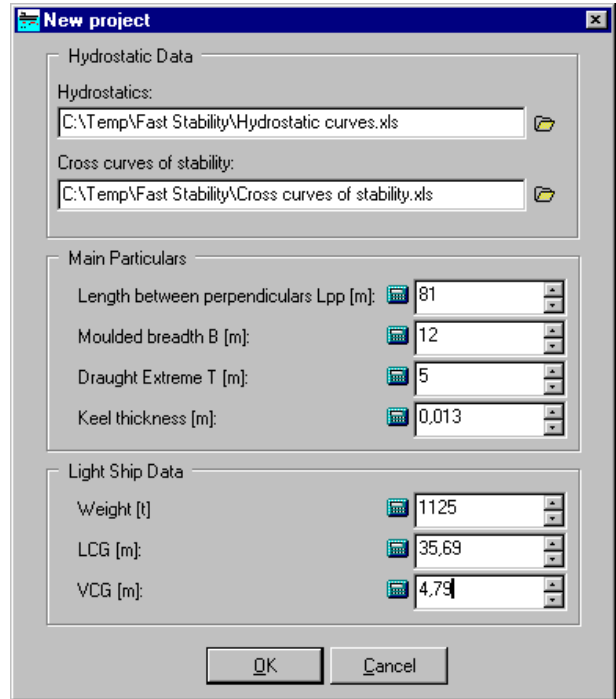− Stability calculation;

Fig. 1. The module for change of ship characteristics

− Draught survey;
− Seakeeping.

The "Change of ship characteristics" module is allowed to (Fig. 1):

− change of main particulars (length, breadth, draught, etc.);
− loading hydrostatics and cross curves from MS Excel format files.

	A	B	C	D	E	F	G	H	I	J
1	T [m]	D [t]	LCF [m]	LCB [m]	KM[m]	M [t-m/m]	TPC [t/cm]	Aft Mark	Fore Mark	
2	1,35	1086	42,55	42,51	10,03	3671	8,46	-1	0,8	
3	1,37	1103			9,92	3678	8,47			
4	1,39	1120	42,56		9,82	3686				
5	1,41	1137			9,72	3693	8,48			
6	1,43	1154			9,61	3700	8,49			
7	1,45	1171		42,52	9,51	3708	8,49			
8	1,47	1188			9,42	3715	8,5			
9	1,49	1205	42,57		9,32	3722	8,5			
10	1,51	1222			9,22	3729	8,51	-0,8		
11	1,53	1239			9,13	3736	8,52			
12	1,55	1256		42,53	9,04	3743	8,52			
13	1,57	1273			8,94	3750	8,53		0,5	
14	1,59	1291	42,56		8,85	3757	8,53			
15	1,61	1308			8,77	3764	8,54			
16	1,63	1325			8,68	3771	8,55			
17	1,65	1342			8,59	3777	8,55			
18	1,67	1359		42,54	8,51	3784	8,56			
19	1,69	1376	42,55		8,43	3791	8,56			
20	1,71	1393	42,55		8,35	3797	8,57			

Fig. 2. The hydrostatics

The FastStability Program loads hydrostatics from Excel format file *.xls. The hydrostatics data must be given in following order (Fig. 2):

– theoretical draught above base line T [m];
– displacement D [t];
– long. center of flotation LCF from AP [m];
– long. center of buoyancy LCB from AP [m];
– KM transverse above base line [m];
– moment change trim 1 cm [tm/cm];
– ton/cm immersion TPC [t/cm]

Depl [t]	10	20	30	40	50	60	70	
1100	1,742	3,087	3,831	4,296	4,582	4,739	4,63	
1151	1,684	3,034	3,798	4,283	4,591	4,755	4,638	
1200	1,629	2,982	3,767	4,27	4,601	4,768	4,648	
1250	1,578	2,933	3,736	4,258	4,611	4,779	4,66	
1300	1,53	2,885	3,707	4,246	4,621	4,786	4,673	
1350	1,486	2,838	3,679	4,235	4,631	4,789	4,689	
1400	1,446	2,794	3,652	4,224	4,639	4,788	4,707	
1450	1,408	2,75	3,625	4,214	4,644	4,786	4,727	
1500	1,374	2,708	3,599	4,205	4,647	4,784	4,748	
1550	1,343	2,667	3,573	4,196	4,649	4,781	4,769	
1600	1,315	2,627	3,549	4,187	4,648	4,779	4,791	
1650	1,289	2,588	3,525	4,179	4,645	4,777	4,813	
1700	1,264	2,55	3,503	4,172	4,641	4,776	4,835	
1750	1,24	2,513	3,481	4,165	4,634	4,776	4,857	
1800	1,218	2,478	3,459	4,158	4,626	4,777	4,88	
1850	1,197	2,443	3,439	4,152	4,617	4,779	4,902	
1900	1,178	2,41	3,419	4,147	4,606	4,782	4,924	
1950	1,161	2,378	3,4	4,141	4,595	4,787	4,941	
2000	1,145	2,348	3,381	4,134	4,585	4,791	4,956	

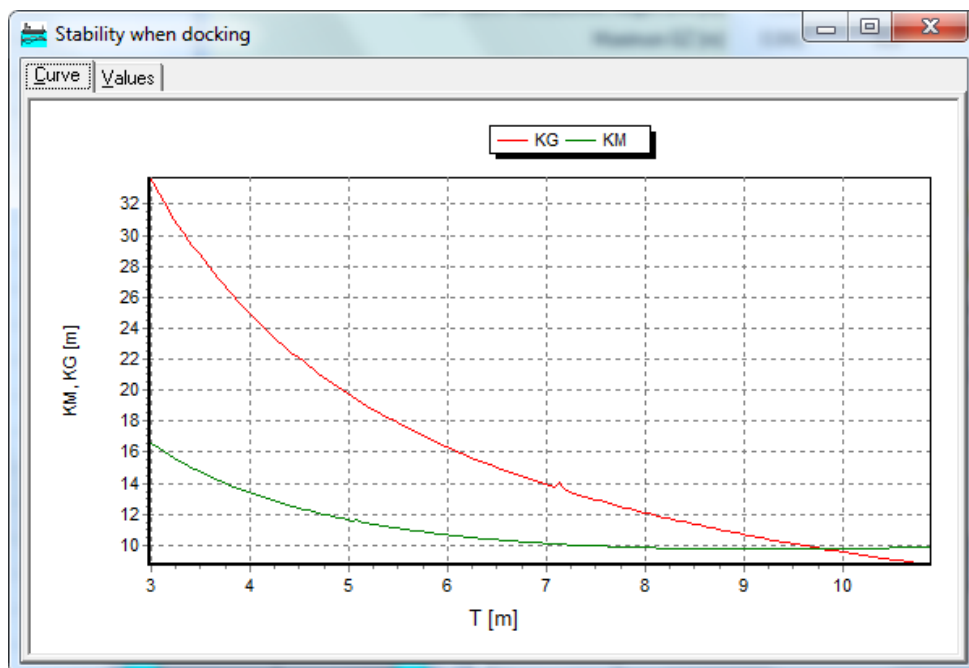Fig. 3. The cross curves of stability

Fig. 4. The module for control stability when docking

49

and data for Draught Survey ("+" fore, "–" aft):

− distance from AP to aft mark [m];
− distance from FP to fore mark [m].

The cross curves must be given in following format (Fig. 3):

− cells in first column: displacement [t];
− cells in first row: angles of heel;
− other cells: values of cross curves [m].

There are following options in "Planning of loading, discharge, reserve and balance" module:

− all types of vessels (container ship, OBO, Tanker, Bulk carrier, ...) with retrieval of any loading conditions as a combination of single items, tanks, containers, bulk cargo, etc.;
− automatic access to ship data available in the system, such as: hydrostatics, cross curves or limits of stability;
− stability when docking (Fig. 4);
− run aground (Fig. 5);
− reserve of deadweight calculation;
− automatic balance correction for two points due to the extreme draught and trim;
− voyage information.

The "Stability calculation" module consist of (Fig. 6):

− several GM-limits;
− leverarm balance, single values, area below leverarm curve;
− trim and heel;
− IMO weather criterion;
− grain stability calculations.

The "Draught survey" module consist of (Fig. 7):

− fast calculation of tank weights;
− saving and loading data;
− print, print preview and printer set-up options;
− extra export to Excel file which enables preparing reports in standard format (e.g. NBC).

The "Seakeeping" module is allowed to (Fig. 8):

− motion transfer functions;
− prediction of: roll, pitch, heave, slamming, acceleration, screw surfacing, green water;
− calculation of Seakeeping Performance Index;
− prediction of ship operability in heavy seas;
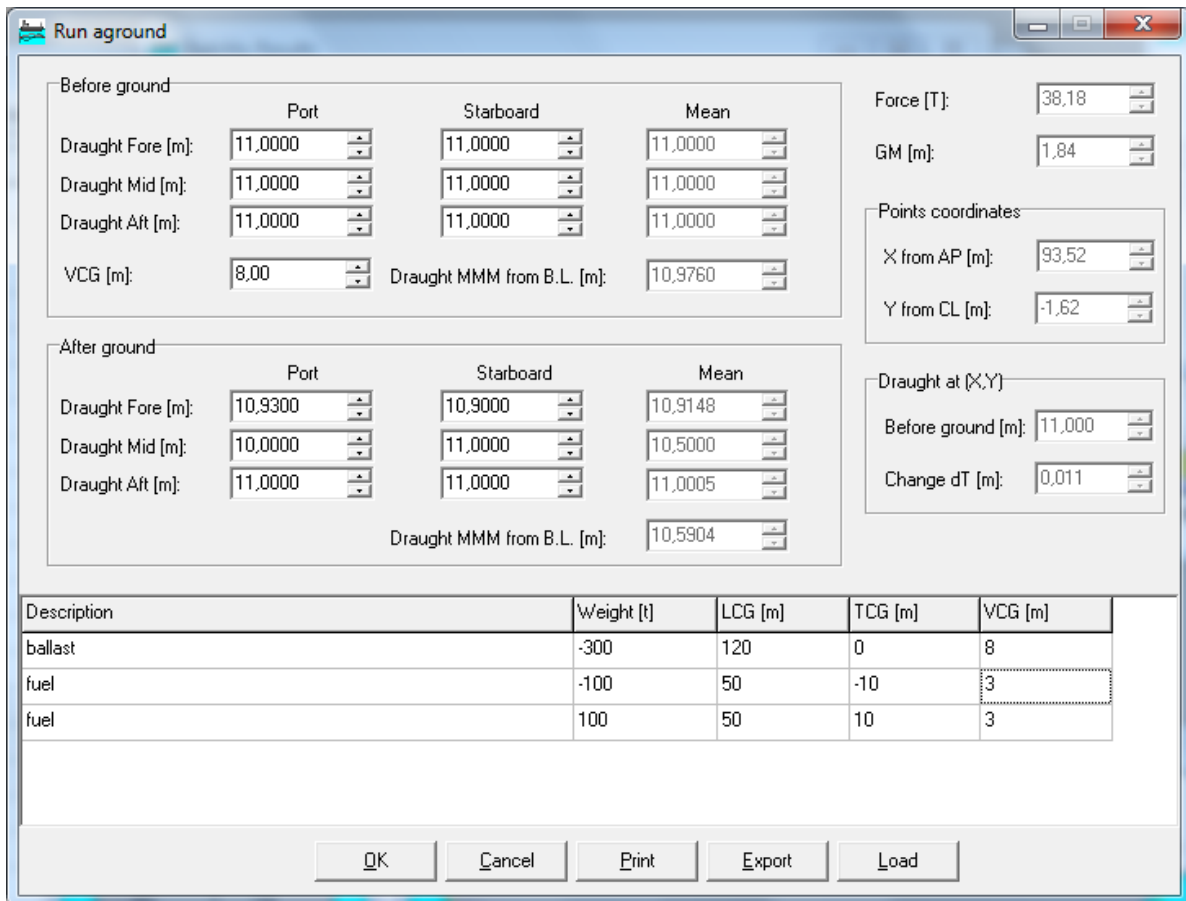− optimum service parameters on the red-green circular chart.
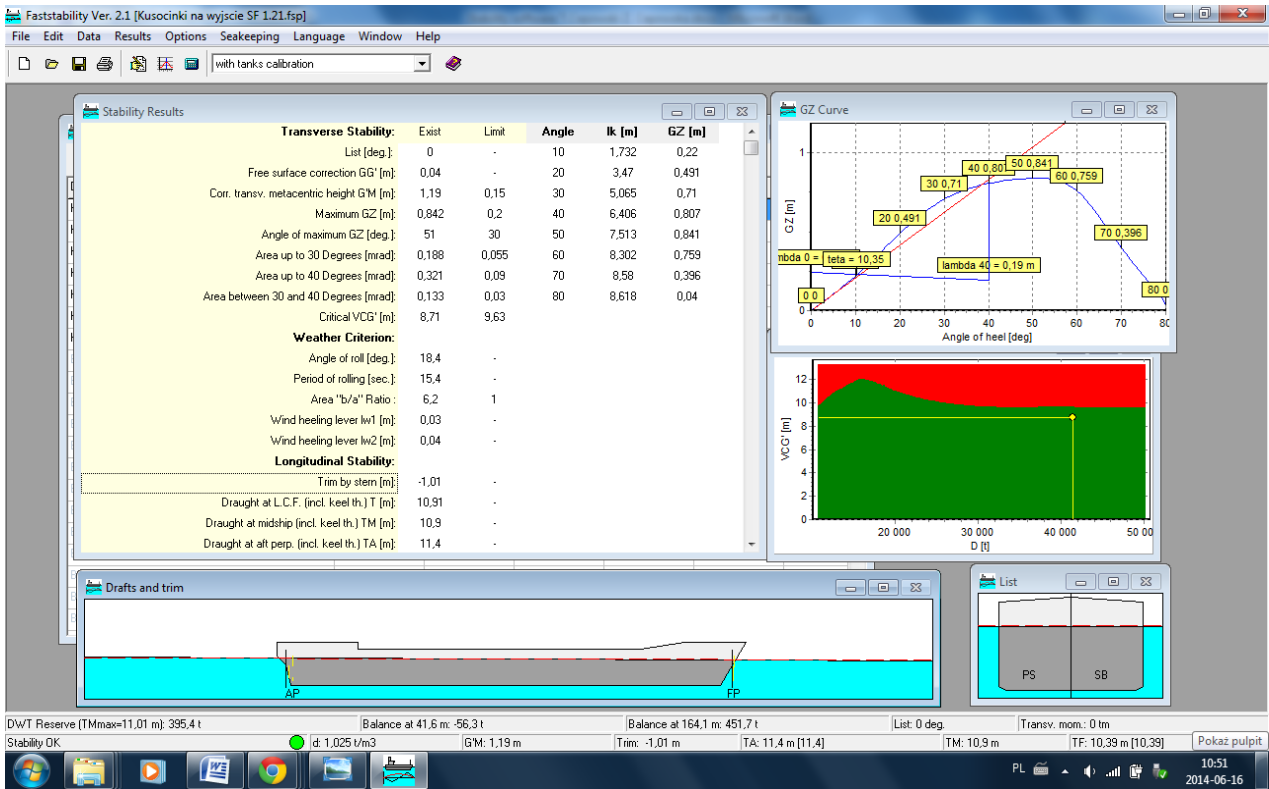

Fig. 5. The module of run aground
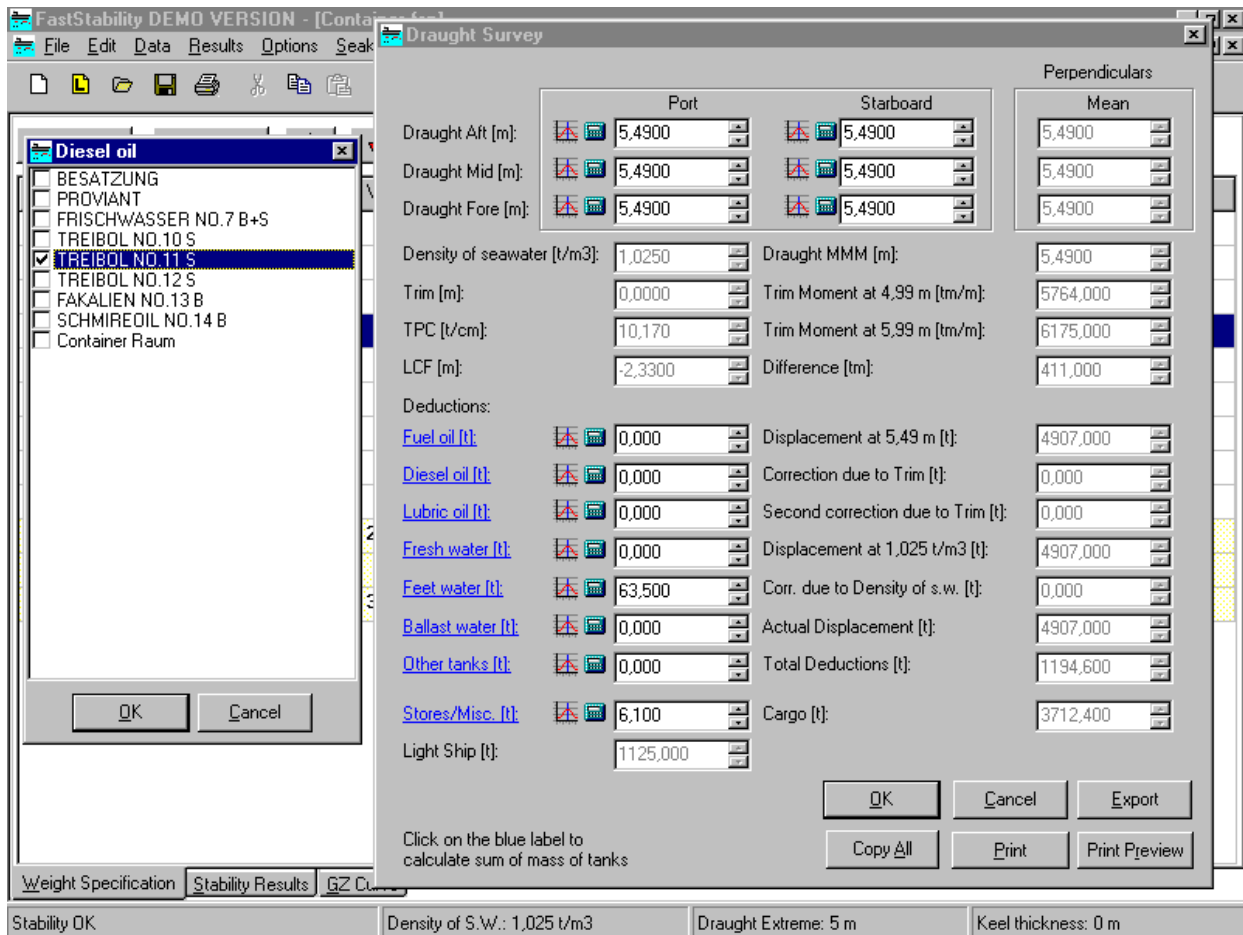
Fig. 6. The "Stability calculation" module

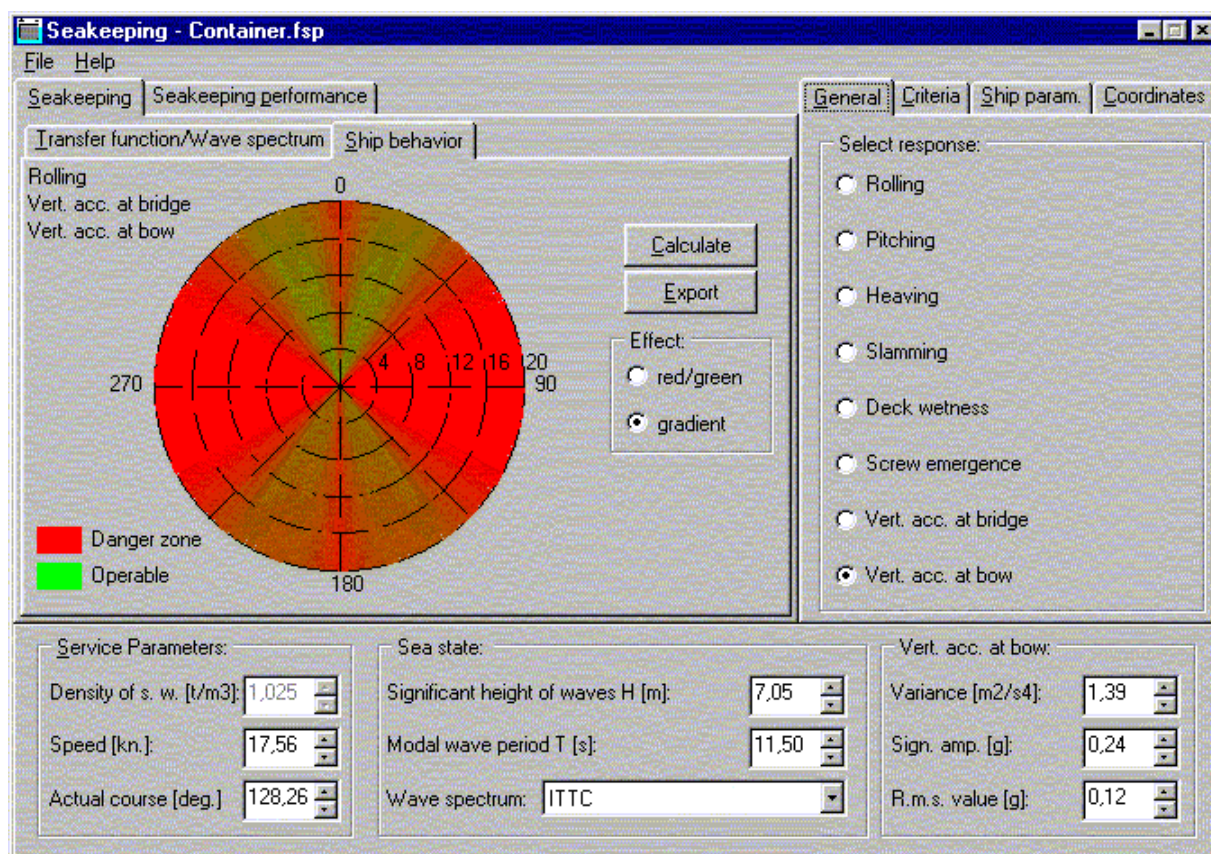Fig. 7. The "Draught durvey" module

Fig. 8. The "Seakeeping" module

Conclusions

Innovative software "FastStability" presented in the article has been developed for all kind of vessels and calculates stability with many additional options:

– Change of ship characteristics;
– Planning of loading, discharge, reserve and balance;
– Stability calculation;
– Draught survey;
– Seakeeping.

The special effect of education in the maritime schools is the ability to using ships' stability software. The "Fast Stability" program is used in Post-Secondary Maritime School in Szczecin to training and learning. Presented stability software is allowed to examination before the Central Examination according to [5].

References

1. www.szkolamorska.pl
2. CEPOWSKA Ż., CEPOWSKI T.: The computer software "Egzamin" for the assessment of education in the maritime schools. Scientific Journals Maritime University of Szczecin 35(107), 2013, 11–14.
3. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 78/95.
4. Rozporządzenie Ministra Infrastruktury z dnia 13 lipca 2005 r. w sprawie programów szkoleń i wymagań egzaminacyjnych w zakresie kwalifikacji zawodowych marynarzy, D.U. 2005 nr 173, poz. 1445.
5. Ustawa z dnia 18 sierpnia 2011 r. o bezpieczeństwie morskim. Dz.U. 2011 nr 228, poz. 1368.

Others

6. CEPOWSKI T.: Innovative software for planning and simulation of cargo handling and ballast water exchange on the ship. Scientific Journals Maritime University of Szczecin 35(107), 2013, 15–21.
7. CEPOWSKI T.: Oprogramowanie komputerowe do prognozowania właściwości morskich statku bazujące na sztucznych sieciach neuronowych. Zeszyty Naukowe Politechniki Radomskiej, 2005.