

# POWER模块介绍

张新华



通力有限公司  
UNITED FORCE CORPORATION



# 实现的功能

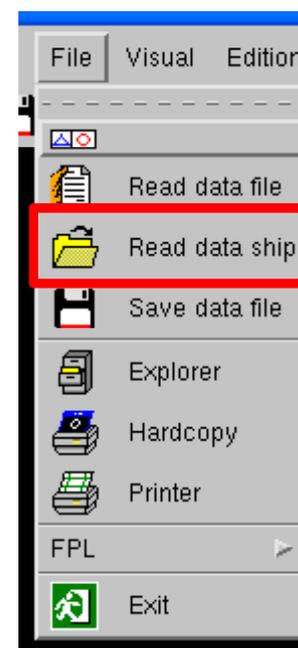
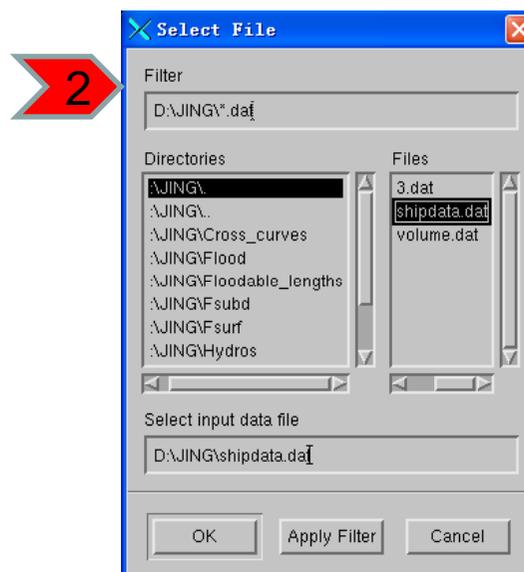
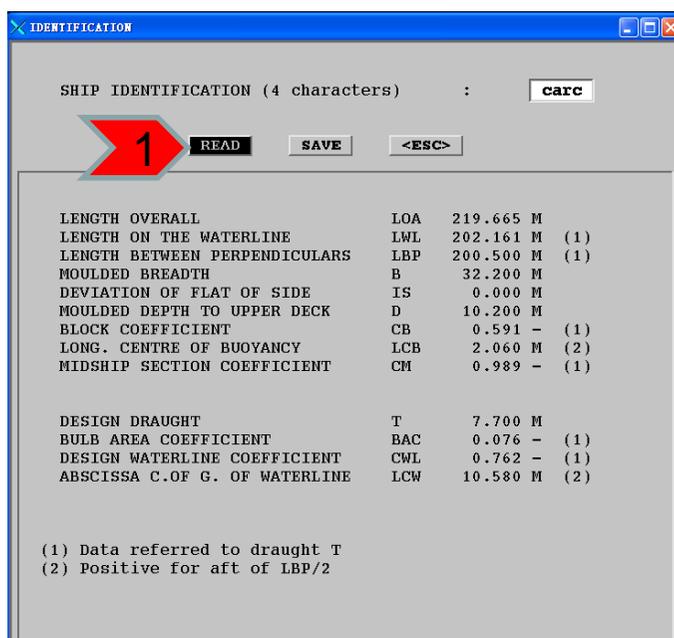
- 阻力和速度估算
- 螺旋桨设计
- 舵设计

# 读取船型数据

## ■ 方法

- 1) 从型线文件里读取主要船型数据：执行File->Read data ship命令
- 2) 从一个船型数据文件里读取主要船型数据：执行File->Read data file命令

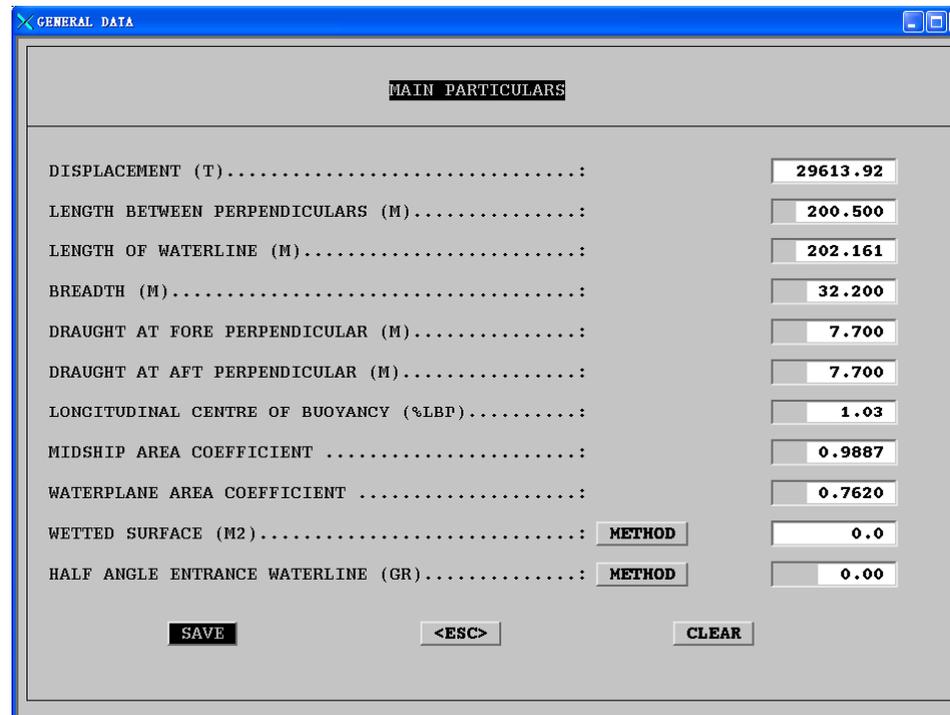
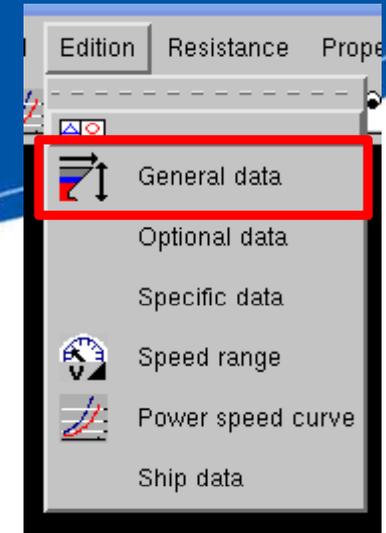
## ■ 保存船型数据：执行File->Save data ship命令，保存一个.d格式的文件



# 阻力和速度估算 (1)

## ■ 步骤

1) 查看主要船型数据: 执行File->Read data ship命令

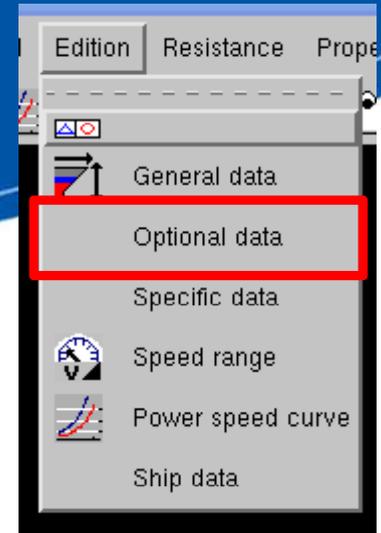


The 'GENERAL DATA' window displays the following data:

MAIN PARTICULARS	
DISPLACEMENT (T).....	29613.92
LENGTH BETWEEN PERPENDICULARS (M).....	200.500
LENGTH OF WATERLINE (M).....	202.161
BREADTH (M).....	32.200
DRAUGHT AT FORE PERPENDICULAR (M).....	7.700
DRAUGHT AT AFT PERPENDICULAR (M).....	7.700
LONGITUDINAL CENTRE OF BUOYANCY (%LBP).....	1.03
MIDSHIP AREA COEFFICIENT .....	0.9887
WATERPLANE AREA COEFFICIENT .....	0.7620
WETTED SURFACE (M2).....	METHOD 0.0
HALF ANGLE ENTRANCE WATERLINE (GR).....	METHOD 0.00

Buttons: SAVE, <ESC>, CLEAR

# 阻力和速度估算 (2)



## ■ 步骤

1) 执行Edition->Optional data命令

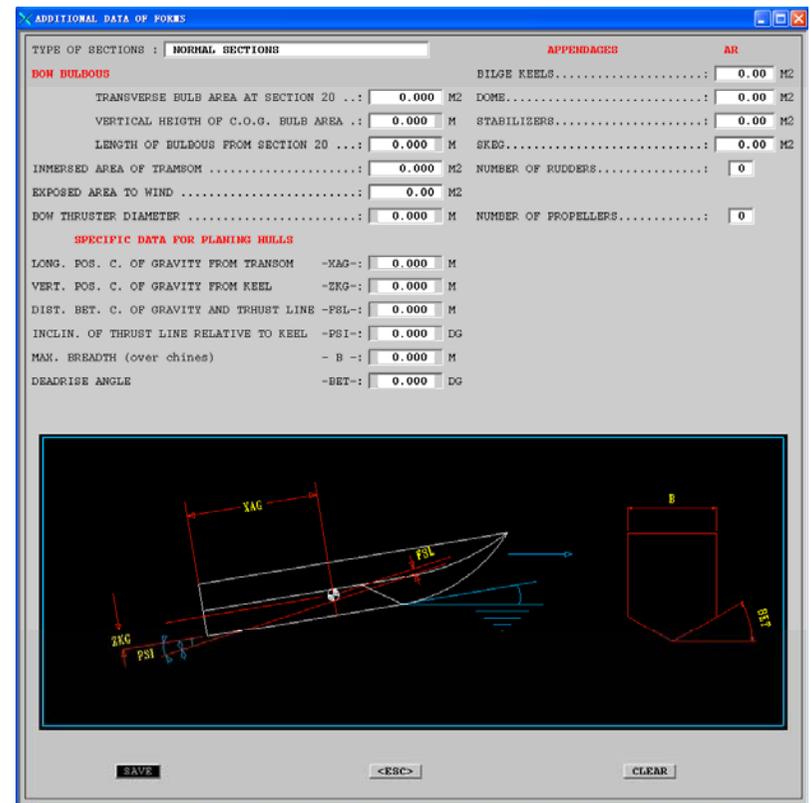
TYPE OF SECTIONS:

- PRAM WITH GONDOLA
- V-SHAPED SECTIONS
- NORMAL SECTIONS
- U-SHAPED SECTIONS
- U-SHAPED SECTIONS WITH HOGNER STERN

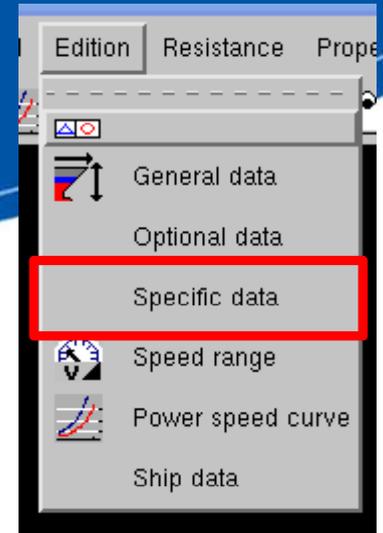
BOW BULBOUS: 球鼻艏数据

APPENDAGERS: 附体数据

SPCIFIC DATA FOR PLANING HULLS: 平底船的特别数据



# 阻力和速度估算（3）



## ■ 步骤

1) 执行Edition>Specific data命令

如果用户选择的是HOLTROP方法估算阻力和速度时，需要定义以下修正值：

- MEAN HULL ROUGHNESS
- HULL FORM FACTOR
- MODEL-SHIP CORRELATION FACTOR \*1000

备注：

METHOD: 根据系统公式计算得出值

USER: 用户自定义值

A screenshot of a dialog box titled 'SPECIFIC DATA'. The dialog box has a blue title bar with standard window controls. The main area is grey and contains the following text:  
**HOLTROP**  
MEAN HULL ROUGHNESS..... **METHOD**  MICRAS  
HULL FORM FACTOR..... **METHOD**   
MODEL-SHIP CORRELATION FACTOR \*1000..... **METHOD**   
At the bottom, there are three buttons: **SAVE**, **<ESC>**, and **CLEAR**.

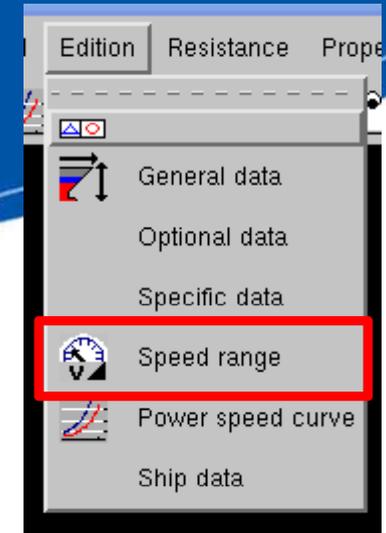
# 阻力和速度估算（4）

## ■ 步骤

1) 执行Edition->Speed range命令

定义要求计算速度范围:

- LOWER SPEED: 速度范围的下限值
- UPPER SPEED : 速度范围的上限值
- INCREMENT: 增长的步长值
- ADDITIONAL SPEEDS: 用户需要额外增加的特殊值

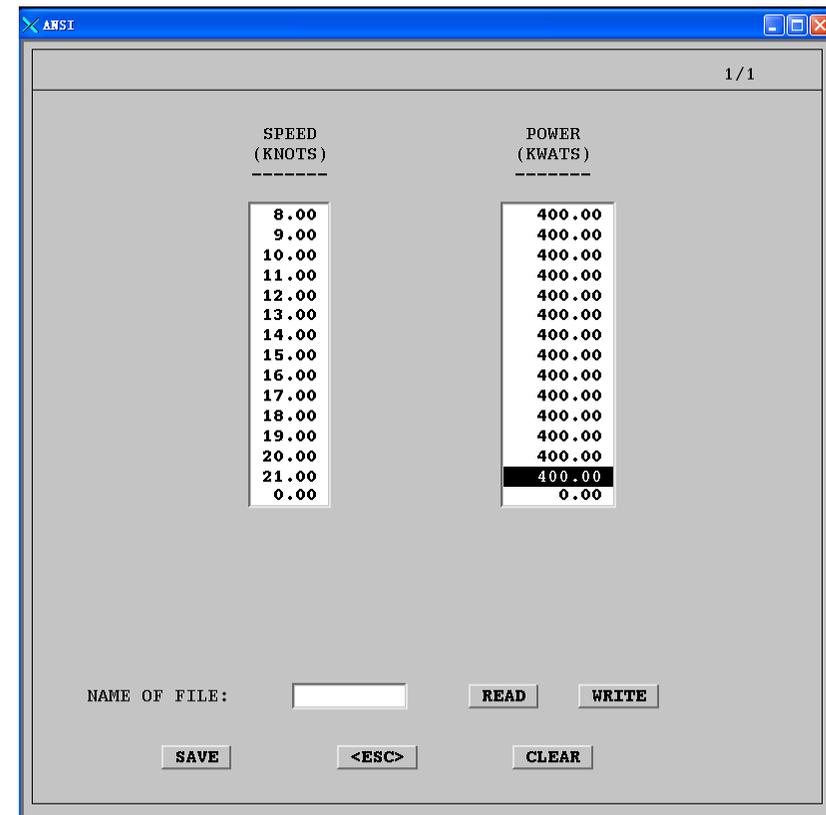
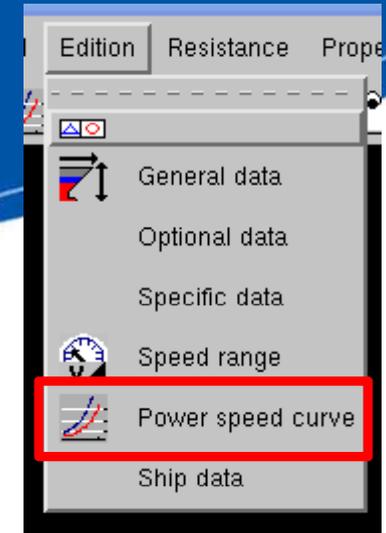
A screenshot of a dialog box titled 'RANGE OF SPEEDS' with an 'ANSI' window title. The dialog contains the following fields and controls:

- LOWER SPEED ..... :  KNOTS
- UPPER SPEED ..... :  KNOTS
- INCREMENT ..... :
- ADDITIONAL SPEEDS (IN KNOTS) :
- 
- Buttons: , ,

# 阻力和速度估算 (5)

## ■ 步骤

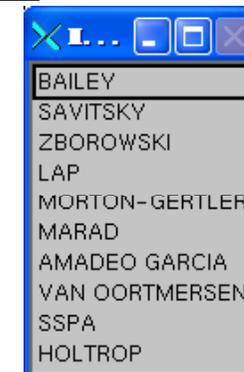
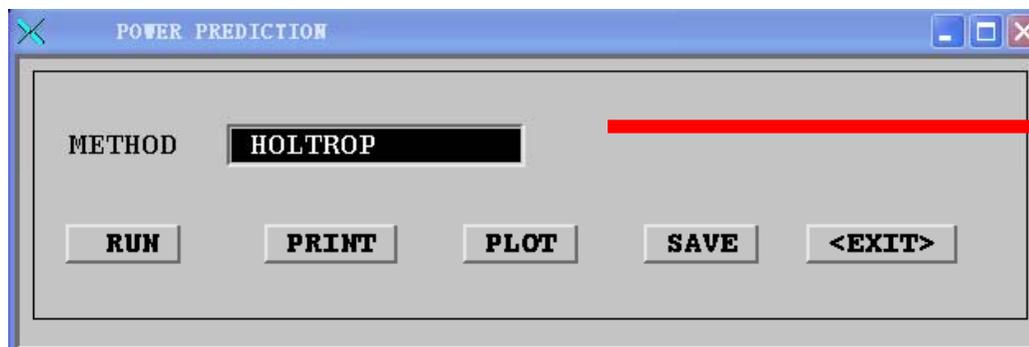
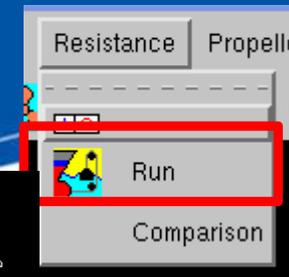
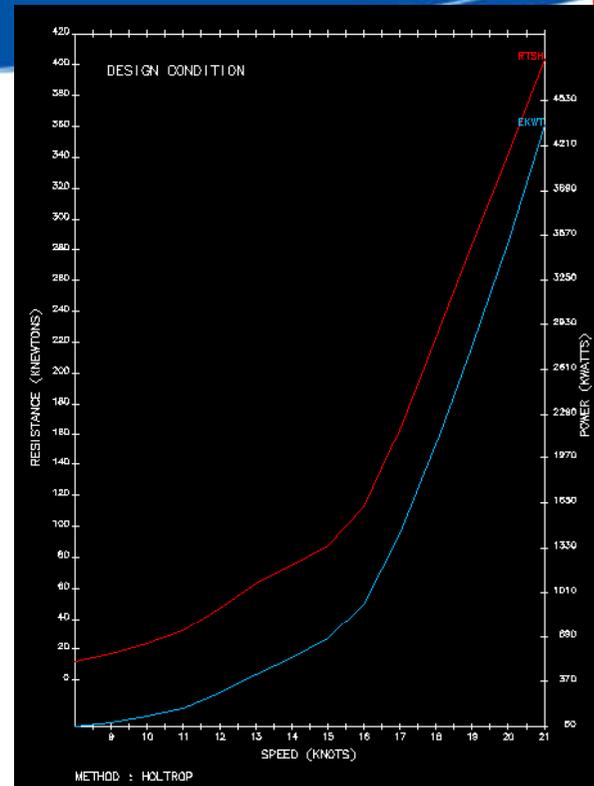
- 1) 执行Edition->Power speed curve命令  
在相应的速度下定义输出的功率。
  - WRITE: 可以保存一个数据文件。
  - READ: 读取一个数据文件填写功率。



# 阻力和速度估算 (6)

## ■ 步骤

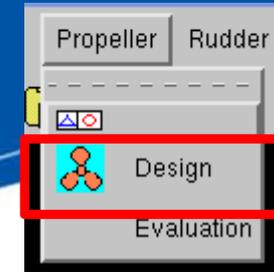
- 1) 执行Resistance->Run命令  
选择计算的方法进行运行
  - RUN: 运行计算
  - PRINT: 另存为一个报告
  - PLOT: 另存为一个图纸
  - EXIT: 退出



# 各种方法的适用范围

方法	应用船型	参数范围
BAILEY	High speed ships with round bilge	For Froude number between 0.3 and 1.2
SAVITSKY	Planing hulls	
ZSBOROWSKI	Twin-screw merchant ships	Block coefficient in the range of 0.518 y 0.645. For Froude number between 0.25 and 0.35
LAP	Single screw merchant ships	
MORTON-GERTLER	General murtipurpose merchant ships	Prismatic coefficient in the range of 0.48-0.86
MARAD	Ships with a high block coefficient	Block coefficient between 0.8 and 0.875. For Froude number in the range of 0.15-0.48
AMADED GARCIA	Fishing vessel with length between 25 and 60 metres	For Froude numbers between 0.24 and 0.4
VAR OORTMERSEN	Small ships, trawlers and tugs	Prismatic coefficient between 0.525 and 0.675. For Froude number in the range of 0.15-0.48
SSPA	Single screw merchant ships	Block coefficient in the range of 0.525-0.725. For Froude number between 0.18 and 0.30
HOLTROP	General method. For all the type of ships	

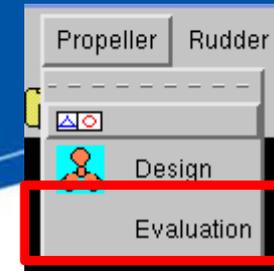
# 螺旋桨设计 (1)



- 命令：执行Propeller->Design命令
- METHOD: 螺旋桨的类型
- NUMBER OF PROPELLERS: 螺旋桨的个数，如果选择1，将会弹出KIND OF STERN（艉部的类型）供选择
- NUMBER OF PROPELLERS BLADES: 螺旋桨的叶数
- HEIGHT OF SHAFT LINE: 轴中心线的高度
- MAXIMUM PROPELLER DIAMETER: 螺旋桨的最大直径
- MECHANICAL EFFICIENCY:
- POWER FACTOR AT SERVICE CONDITION: 服务航速下的主机功率因子
- SEA MARGIN:
- CONDITIONS OF OPTIMIZATION: 优化的条件

A screenshot of the 'PROPELLER DESIGN INPUT DATA' dialog box. It has a blue title bar and a grey background. The 'METHOD' field is set to 'WAGENINGEN B - SERIES'. Below it are several input fields with values: 'NUMBER OF PROPELLERS' (0), 'NUMBER OF PROPELLER BLADES' (0), 'HEIGHT OF SHAFT LINE' (0.000 M), 'MAXIMUM PROPELLER DIAMETER' (0.000 M), 'MECHANICAL EFFICIENCY' (0.0000), 'POWER FACTOR AT SERVICE CONDITION' (0.00 %), and 'SEA MARGIN' (5.000 %). There is a section for 'CONDITIONS OF OPTIMIZATION' with 'NOMINAL POWER (MCR)' (0.00 KWATS) and 'PROPELLER RATE' (0.00 RPM). At the bottom are buttons for 'RUN', 'PRINT', 'PLOT', and '<EXIT>'. A red arrow points from the 'METHOD' selection dialog box above to the 'METHOD' field in this dialog.

# 螺旋桨设计 (2)

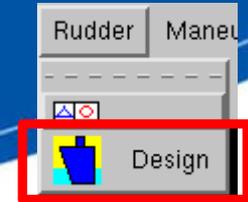


- 命令：执行Propeller->Evaluation命令：根据不同的盘面比和展开比进行螺旋桨优化设计
- KIND OF PROPELLER: 螺旋桨的类型
- NUMBER OF PROPELLERS: 螺旋桨的个数
- NUMBER OF PROPELLERS BLADES: 螺旋桨的叶数
- HEIGHT OF SHAFT LINE: 轴中心线的高度
- PITCH/DIAMETER RADIO: 填写最小和最大的盘面比
- EXPANDED BLADE AREA/DISC AREA RADIO: 填写最小和最大的展开比
- PROPELLER RATE: 螺旋桨的转速
- SHIP SPEED: 船的速度
- CAVITATION CRETERION: 标准
- HEIGHT OF SHAFT LINE: 轴中心线的高度
- VARIABLE FOR COMPARING: 需要显示的相关参数

PARAMETER	VALUE
KIND OF PROPELLER	WAGENINGEN B - SERIES
NUMBER OF PROPELLERS	2
NUMBER OF PROPELLER BLADES	3
PROPELLER DIAMETER	1.400 M
PITCH/DIAMETER RATIO	MINIMUM: 0.9545, MAXIMUM: 0.0000
EXPANDED BLADE AREA/DISC AREA RATIO	MINIMUM: 0.3635, MAXIMUM: 0.0000
PROPELLER RATE	286.0 RPM
SHIP SPEED	10.00 KNOTS
CAVITATION CRITERION	BURRIL
HEIGHT OF SHAFT LINE	1.000 M
VARIABLE FOR COMPARING	SHAFT POWER

Buttons: RUN, PRINT, PLOT, <EXIT>

# 舵的设计



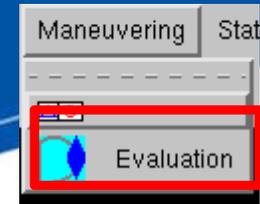
- 命令：执行Rudder->Design命令：设计一个合适的舵
- Length between perpendiculars: 垂线间长
- Beam: 型宽
- Draught at fore perpendicular: 艏垂线的吃水
- Draught at aft perpendicular: 艉垂线的吃水
- Displacement: 排水量
- Number of propellers: 螺旋桨的个数
- Propeller Diameter : 螺旋桨的直径
- NUMBER OF RUDDERS: 舵的个数
- MINIMUM DRAFT AT AFT PERP: 舵垂线处可能的最小吃水
- HEIGHT OF SHAFT LINE: 轴中心线的高度
- RELAT. THINK. THAT IS WISHED: 此值系统能自动运算，或用户自己定义
- METHOD FOR CALCULATING COMPENSATING SUFACE: 计算时修正的方法

PROJECT CONDITION		BALLAST CONDITION	
PROJECT SPEED OF SHIP.....:	10.00 KNOTS	0.00 KNOTS	
TOTAL RESISTANCE.....:	24.88 KN	0.00 KN	
WAKE FRACTION.....:	0.1407	0.1407	
THRUST DEDUCTION FRACTION.....:	0.1473	0.1473	

Parameters shown in the screenshot include: LENGTH BETWEEN PERPENDICULARS (44.000 M), BEAM (8.500 M), DRAUGHT AT FORE PERPENDICULAR (1.700 M), DRAUGHT AT AFT PERPENDICULAR (1.700 M), DISPLACEMENT (458.04 TONS), NUMBER OF PROPELLERS (2), PROPELLER DIAMETER (1.50 M), NUMBER OF RUDDERS (2), MINIMUM DRAFT AT AFT PERP (1.50 M), HEIGHT OF PROPELLER ABOVE BASE LINE (1.00 M), HEIGHT HULL LINE-BASE LINE (1.70 M), RELAT. THICK. THAT IS WISHED (0.000), and METHOD FOR CALCULATING COMPENSATING SURFACE (MEAN VALUE).

- 设计状态和压载状态下的其它参数
- PROJECT SPEED OF SHIP: 速度
- TOTAL RESISTANCE: 总共的阻力
- WAKE FACTIION: 因子
- THRUST REDUCTION FRACTION: 因子

# 舵的设计



- 命令：执行Maneuvering->Evaluation命令：按照图形所示定义相关值

MANEUVRABILITY PREDICTION

LENGTH BETWEEN PERPENDICULARS: <input type="text" value="44.000"/> M	NUMBER OF RUDDERS.....: <input type="text" value="2"/>
BEAM.....: <input type="text" value="8.500"/> M	HEIGHT OF PROPELLER ABOVE BASE LINE: <input type="text" value="1.00"/> M
DRAUGHT AT FORE PERPENDICULAR: <input type="text" value="1.700"/> M	RELATION OF THICKNESS.....: <input type="text" value="0.000"/>
DRAUGHT AT AFT PERPENDICULAR: <input type="text" value="1.700"/> M	PROJECT SPEED OF SHIP.....: <input type="text" value="10.00"/> KNOTS
DISPLACEMENT.....: <input type="text" value="458.04"/> TONS	TOTAL RESISTANCE.....: <input type="text" value="24.88"/> KN
NUMBER OF PROPELLERS.....: <input type="text" value="2"/>	WAKE FRACTION.....: <input type="text" value="0.3003"/>
PROPELLER DIAMETER.....: <input type="text" value="1.50"/> M	THRUST DEDUCTION FRACTION.....: <input type="text" value="0.1700"/>

RUDDER HEIGHT.....HRU : <input type="text" value="1.50"/> M	
HEIGHT FIX PORTION.....HRUX : <input type="text" value="0.30"/> M	
CHORD STOCK-AFT EDGE AT ROOT...CHRTA : <input type="text" value="0.50"/> M	
CHORD STOCK-FORM EDGE AT ROOT...CHRTF : <input type="text" value="0.20"/> M	
CHORD STOCK-AFT EDGE AT TIP...CHTPA : <input type="text" value="0.80"/> M	
CHORD STOCK-FORM EDGE AT TIP...CHTPF : <input type="text" value="0.40"/> M	
CHORD FIX PORTION AT ROOT.....CHRTX : <input type="text" value="0.30"/> M	
CHORD FIX PORTION AT TIP.....CHTPX : <input type="text" value="0.20"/> M	

RUN    PRINT    PLOT    <EXIT>

