

ABSTRAK

Kemajuan dalam dunia minyak bumi dan gas mendorong berkembangnya eksplorasi terhadap perairan lepas pantai. Dalam dunia kemaritiman, kapal juga berfungsi sebagai sarana transportasi untuk *oil rig facility* dan *platform* penyimpanan minyak lepas pantai. Pengembangan terhadap struktur *offshore platform*, kini memungkinkan kapal bisa mengirim dan memuat kebutuhan dan komponen platform. Kapal *Platform Supply Vessel* (PSV) ini berdinamis membantu *oil rig platform* dan anjungan dengan menyuplai bahan persediaan, bahan bakar, perlengkapan, perkakas dan barang yang diperlukan oleh anjungan lepas pantai. Dengan adanya aktivitas pengangkutan muatan yang dilakukan oleh kapal ini, menyebabkan terjadinya perpindahan titik berat kapal yaitu titik *G centre of gravity* (G), yang bisa mempengaruhi pada stabilitas kapal tersebut. Oleh karena itu, diperlukan penelitian untuk menganalisa dan melakukan perhitungan seberapa besar dampaknya terhadap stabilitas kapal, karena perpindahan titik ini dapat menyebabkan *capsizing*, lebih buruknya kapal tenggelam.

Penelitian ini akan menganalisa stabilitas pada kapal *Platform Supply Vessel* (PSV), dengan menggunakan beberapa bantuan *software* seperti AutoCAD dan Maxsurf, dimana untuk perancangan desain gambar 2D menggunakan *software* AutoCAD, desain pemodelan kapal 3D menggunakan *software* Maxsurf Modeller Advanced. Perhitungan analisis stabilitas akan memanfaatkan bantuan *software* Maxsurf Stability Advanced dan memenuhi kriteria stabilitas yang telah ditentukan oleh ketentuan regulasi IMO (*International Maritime Organization*).

Fokus penelitian ini adalah untuk mengetahui kemampuan kapal untuk menyeimbangkan posisi tegaknya dalam keadaan gelombang laut yang tenang dan keadaan kapal statis, dan untuk mendapatkan desain kapal dengan nilai *righting arm* dan *heeling angle* yang besar (melebihi 1 rad) sehingga dapat menghasilkan kemampuan *anti capsized*. Analisa stabilitas dilakukan pada kapal PSV sebanyak 6 variasi kondisi *loadcase* kapal berdasarkan kriteria *International Maritime Organisation* (IMO) yaitu ketentuan IMO (*International Maritime Organization*) *Resolution Code A.749 (18) Ch 3 – design criteria applicable to all ship Amended by MSC.75 (69) Static Stability* diperoleh data hasil dimana kondisi *loadcase* II yaitu Kondisi *Full Loaded Departure* mendapatkan data nilai derajat keolengan tertinggi dari seluruh variasi kondisi *loadcase*, dengan nilai lengan penegak maksimal (GZ) 4,122 m dengan *heeling degree* 70,9° pada kapal PSV. Kapal memiliki berat LWT atau *lightship* seberat 3185 Ton, nilai LCG (*Longitudinal Center of Gravity*) dan VCG (*Vertical Centre of Gravity*), LCG -4,350 m, VCG -3,236 m. Hasil perhitungan seluruh variasi kondisi *loadcase* menghasilkan data bahwa stabilitas dari kapal PSV dinyatakan sudah memenuhi standar (*pass*) yang ditentukan oleh standar IMO, sehingga dapat disimpulkan bahwa kapal PSV ini memiliki kemampuan stabilitas yang baik dan aman. Pada beberapa percobaan uji analisa stabilitas pada keseluruhan variasi kondisi *loadcase* kapal menghasilkan rata-rata nilai letak titik G (*gravity*) yang sudah serendah mungkin, bahkan ada yang di bawah nilai letak titik B (*buoyancy*), dimana dari masing-masing kondisi *loadcase* memiliki nilai lengan penegak GZ dan *heeling angle* yang relatif besar (melebihi 1 rad = 57,32...°).

Kata Kunci: Stabilitas, PSV (*Platform Supply Vessel*), *Anti Capsized*, IMO, Titik Berat (G), *Loadcase*, Lengan Penegak, Derajat Kemiringan

ABSTRACT

Advances in the world of oil and gas at this time led to the development of exploration of offshore waters. In the maritime world, where now ships are no longer only used to transport people and goods, but also function as transportations units of drilling facilities and offshore oil storage platforms. The development of offshore platform structures, now allows ships to be able to transport and transport platform components and needs. The Platform Supply Vessel (PSV) is tasked with assisting the rig, platform or standby boat by supplying food, clean water, fuel, equipment or materials needed by the offshore platform. With the cargo transportation activities carried out by this ship, it causes a displacement of the ship's center of gravity (G), which can affect the stability of the ship. Therefore, research is needed to analyze and calculate how much it affect the stability of the ship, because the displacement of this point can cause capsizing, worse the ship sinks.

This research will analyze the stability of the Platform Supply Vessel (PSV) ship, using some software support such as AutoCAD and Maxsurf, where for 2D drawing design using AutoCAD software, 3D ship modeling design using Maxsurf Modeller Advanced software. Calculation of stability analysis will utilize the help of Maxsurf Stability Advanced software and meet the stability criteria determined by the provisions of the IMO (International Maritime Organization) regulations.

The focus of this research is to determine the ship's ability to balance its upright position in calm sea waves and static ship conditions, and to obtain ship designs with large righting arm and heeling angle values (exceeding 1 rad) so as to produce anti-capsize capabilities. Stability analysis on PSV ships as many as 6 variations of loadcase conditions or ship loading based on International Maritime Organization (IMO) criteria, namely the provisions and provisions of the IMO (International Maritime Organization) Resolution Code A.749 (18) Ch 3 - design criteria applicable to all ships Amended by MSC.75. (69) Static Stability obtained data results where loadcase II conditions, namely Departure at Harbor Conditions by obtaining data on the highest degree value of the overall variation of loadcase conditions, with a maximum enforcement arm (GZ) value of 4.122 m, which is at a heeling degree of 70.9 ° on PSV ships. The ship has a LWT weight or what is usually called a lightship weighing 3185 tons, in addition to the VCG (Vertical Center of Gravity and LCG (Longitudinal Center of Gravity) values. LWT value of 3185 tons, LCG -4.350 m, VCG -3.236 m, TCG = 0.009 m. besides that the overall calculation results show that the stability of the PSV ship is declared to have met the standards(pass) set by IMO. So it can be concluded that this PSV ship has good stability capabilities. In some stability analysis test experiments on all variations of ship loadcase conditions, the average value of the location of the G (gravity) point is as low as possible, some are even below the value of the location of the B (buoyancy) point, where each loadcase condition has a relatively large value of the GZ righting arm and heeling angle (exceeding 1 rad = 57.32...0).

Keywords: Stability, PSV (Platform Supply Vessel), Anti Capsize, IMO, Centre of Gravity (G), Loadcase, Righting Arm, Heeling Degree