

SK Validation Study – 3D Force/Moment Amplitude and Phase

The three-dimensional force/moment amplitudes and phases were compared with results from the 3D diffraction panel code DELFRAC. The data used in this report was digitized from plots published by J.M.L Journée on his personal webpage, the URL may be found in the References. Two different “barge-like” geometries were used: a box-barge and a triangular barge. The box-barge has a beam of 30 m, a length of 300 m, and a draft of 15 m, yielding a beam-to-draft ratio of 2. The VCG was set at the waterline, or 15 m. The triangular barge had beam of 34.64 m, a length of 300 m, and a draft of 30 m. The barges were evaluated at wave headings of 0, 30, 60, and 90 degrees. Forward speed is zero and water depth is infinite. The beam factor (See **SEAKEEPING** command documentation for details) is taken at 8 (default).

The results are shown by the following figures. In all cases, the agreement is quite satisfactory. Because SeaKeeping uses a more robust treatment of the surge normal vector than other strip-theory codes, it is able to capture more of the 3D effects. This appears to be most evident at higher frequencies, where diffraction plays a greater role in the total forcing.

At zero wave heading, the sway and roll amplitudes are zero, as evidenced by the seemingly blank plot.

References

Journée, J.M.J. (2001). *Verification and Validation of Ship Motions Program SEAWAY*. Delft: Delft University of Technology Ship Hydromechanics Laboratory, pp. 16-28. Available at: <http://www.shipmotions.nl/DUT/PapersReports/1213-ValidationSEAWAY.pdf> [Last Accessed: 11 Jan. 2018].

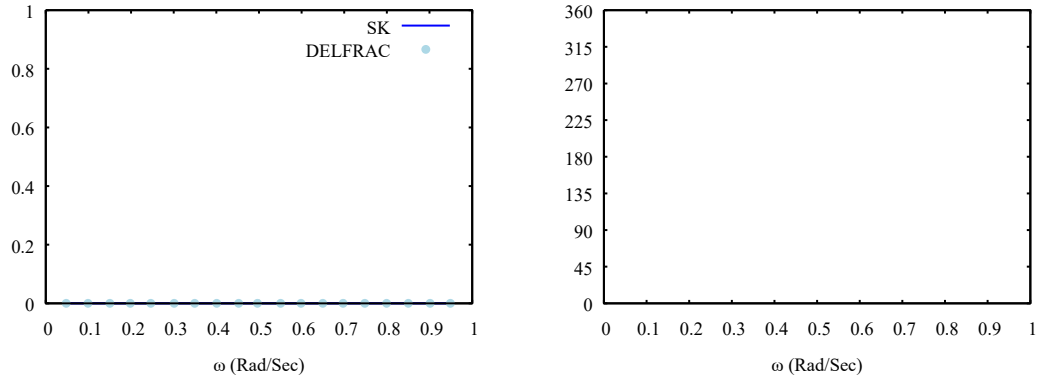


Figure 1 3D Sway Forcing Amplitude and Phase, Heading = 0° – Box Barge

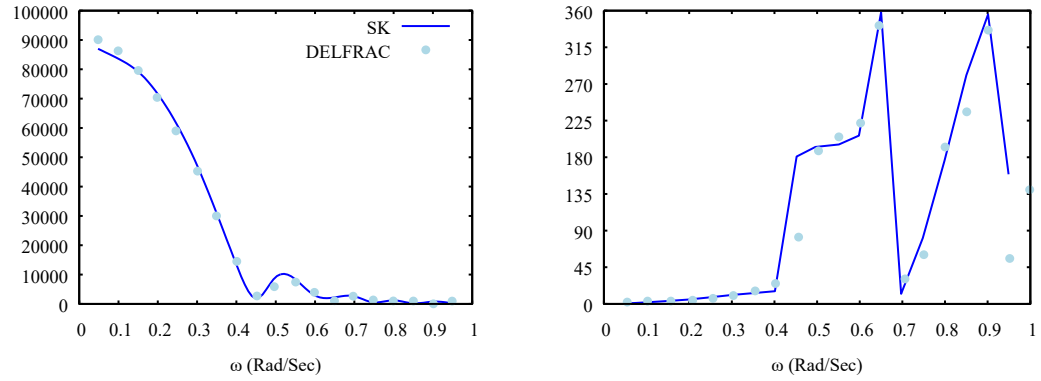


Figure 2 3D Heave Forcing Amplitude and Phase, Heading = 0° – Box Barge

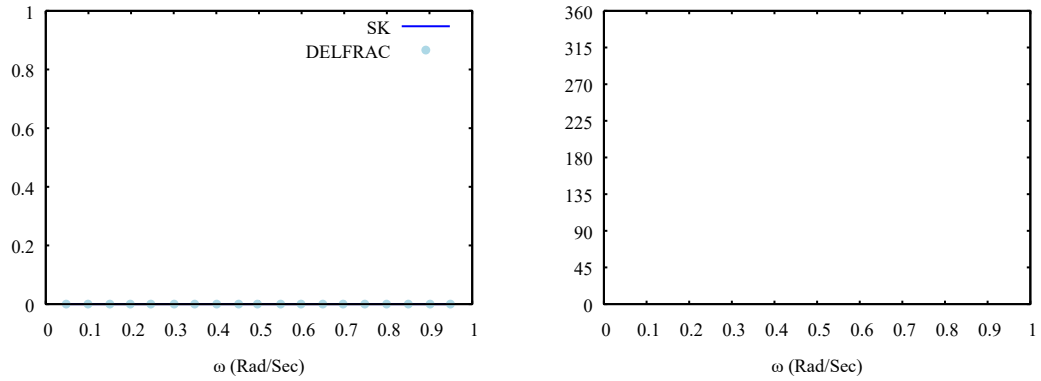


Figure 3 3D Roll Moment Amplitude and Phase, Heading = 0° – Box Barge

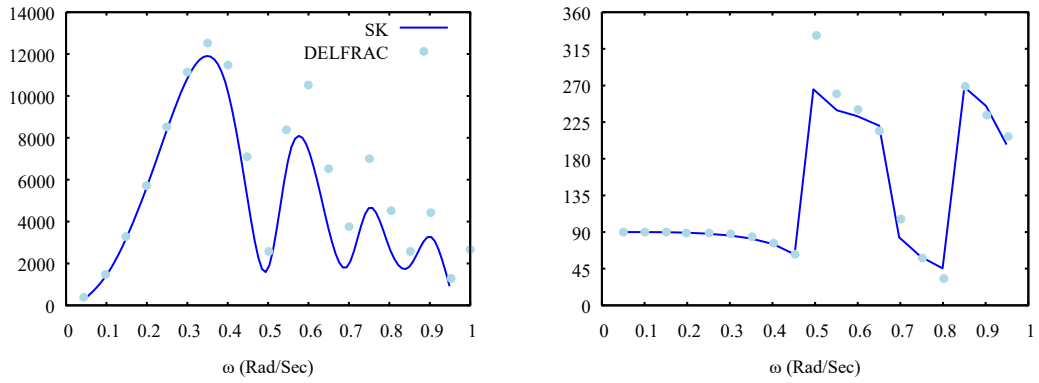


Figure 4 3D Sway Forcing Amplitude and Phase, Heading = 30° – Box Barge

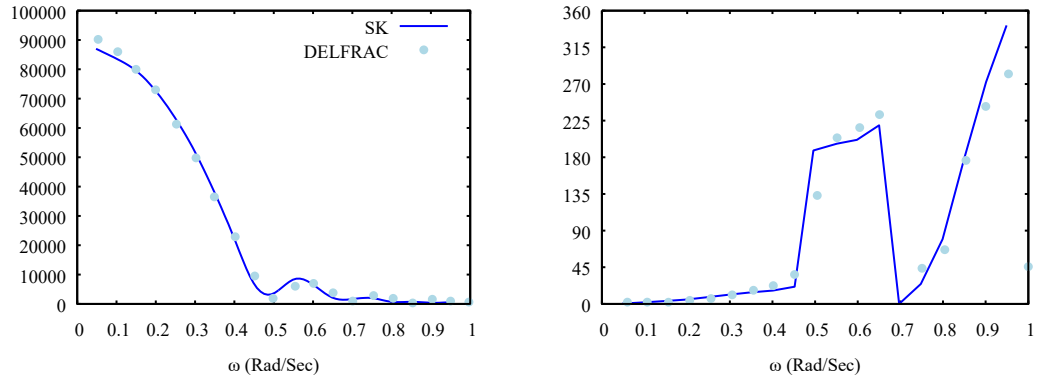


Figure 5 3D Heave Forcing Amplitude and Phase, Heading = 30° – Box Barge

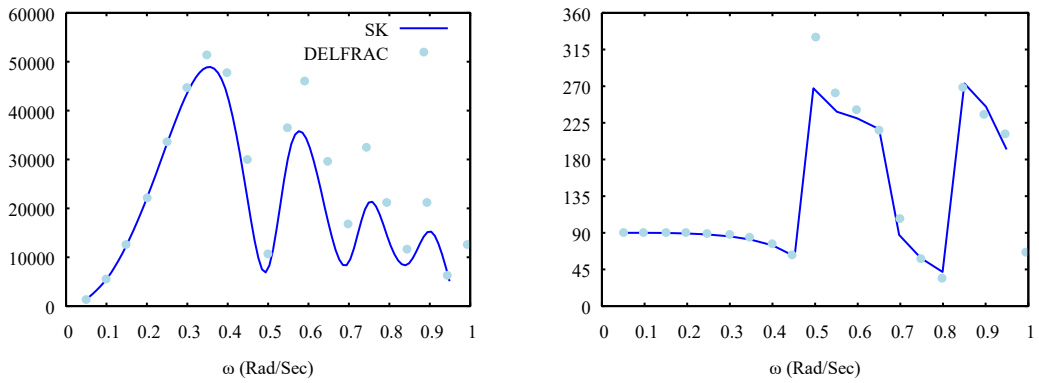


Figure 6 3D Roll Moment Amplitude and Phase, Heading = 30° – Box Barge

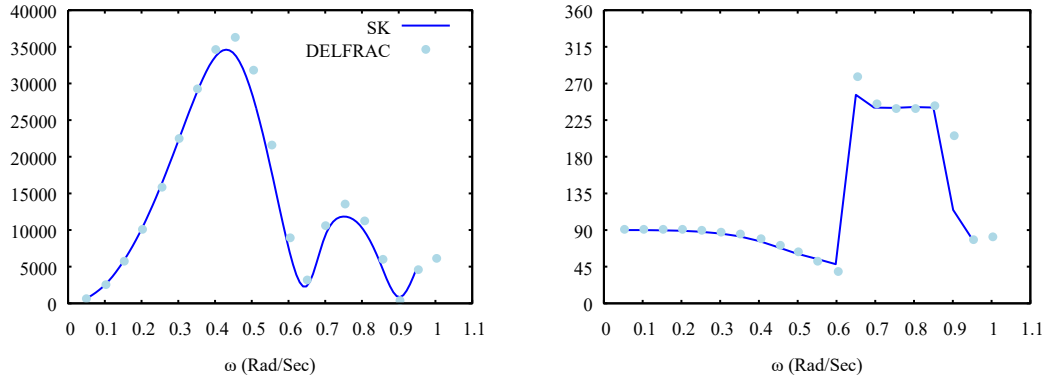


Figure 7 3D Sway Forcing Amplitude and Phase, Heading = 60° – Box Barge

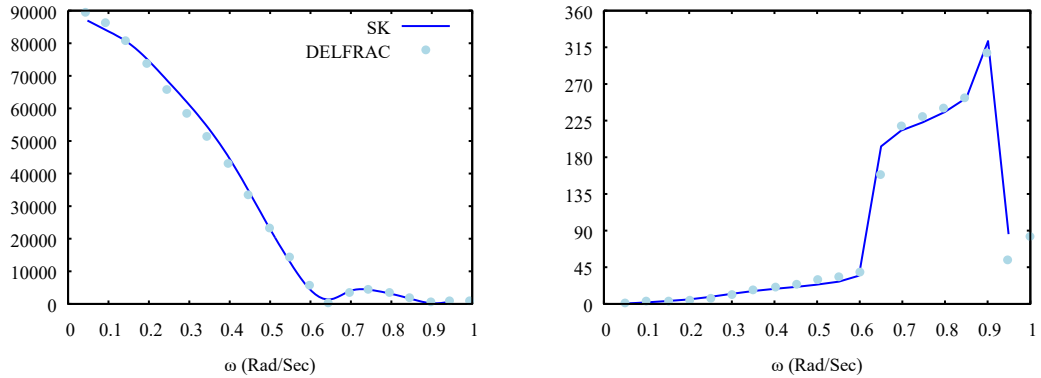


Figure 8 3D Heave Forcing Amplitude and Phase, Heading = 60° – Box Barge

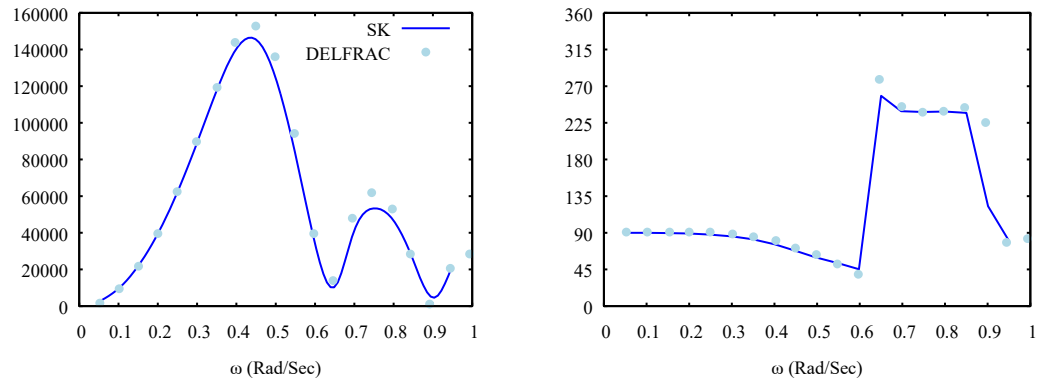


Figure 9 3D Roll Moment Amplitude and Phase, Heading = 60° – Box Barge

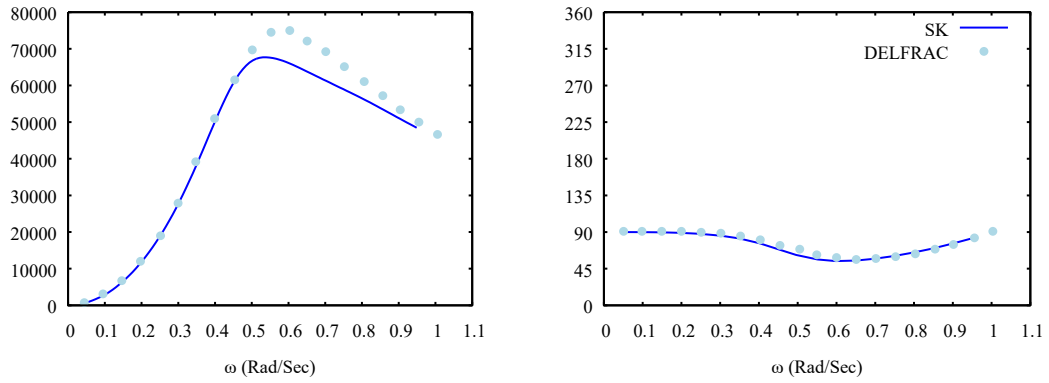


Figure 10 3D Sway Forcing Amplitude and Phase, Heading = 90° – Box Barge

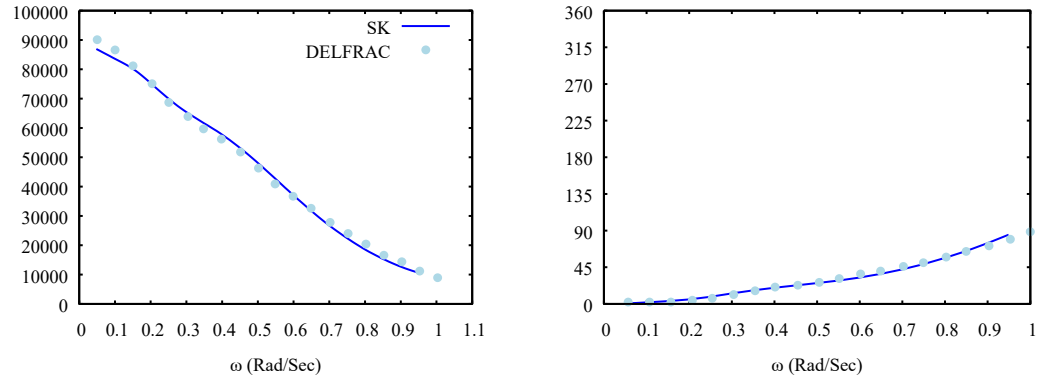


Figure 11 3D Heave Forcing Amplitude and Phase, Heading = 90° – Box Barge

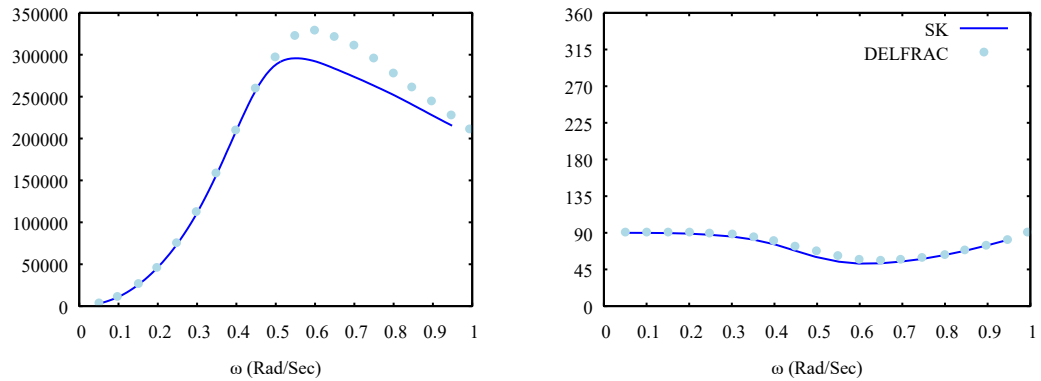


Figure 12 3D Roll Moment Amplitude and Phase, Heading = 90° – Box Barge

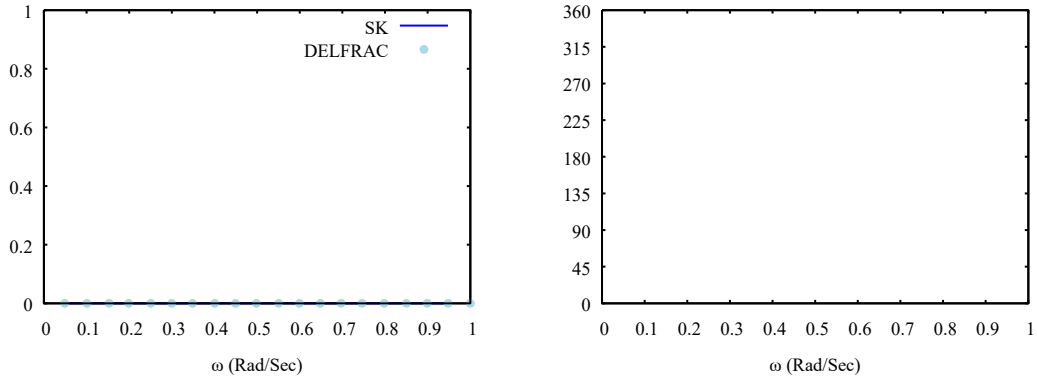


Figure 13 3D Sway Forcing Amplitude and Phase, Heading = 0° – Triangle Barge

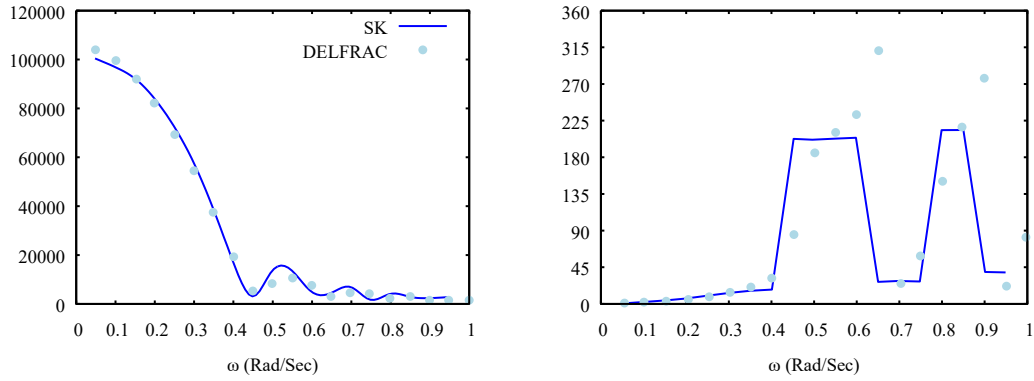


Figure 14 3D Heave Forcing Amplitude and Phase, Heading = 0° – Triangle Barge

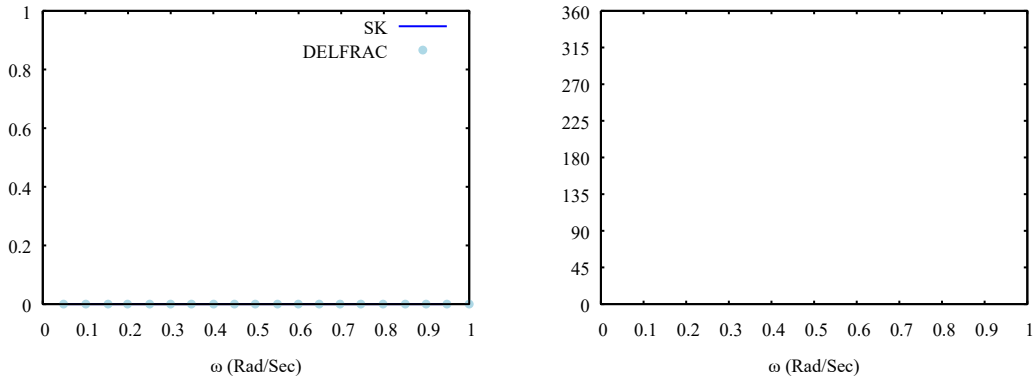


Figure 15 3D Roll Moment Amplitude and Phase, Heading = 0° – Triangle Barge

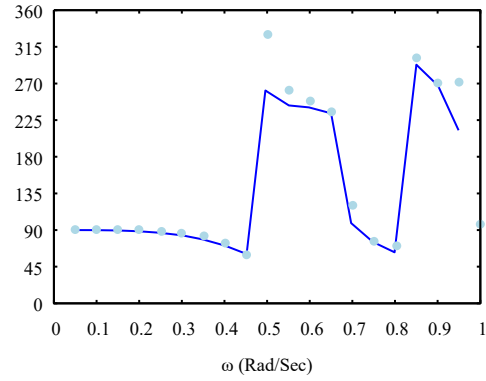
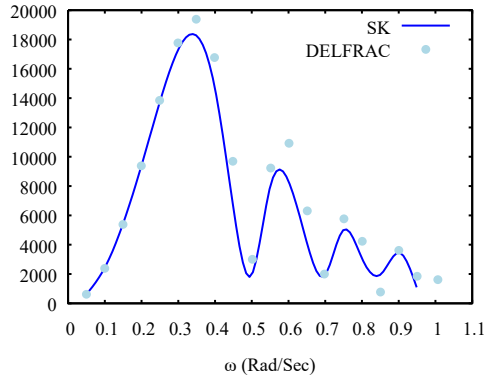


Figure 16 3D Sway Forcing Amplitude and Phase, Heading = 30° – Triangle Barge

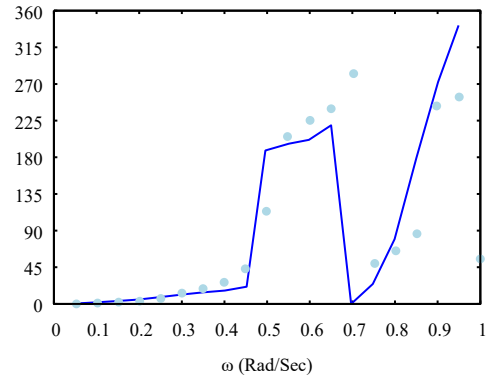
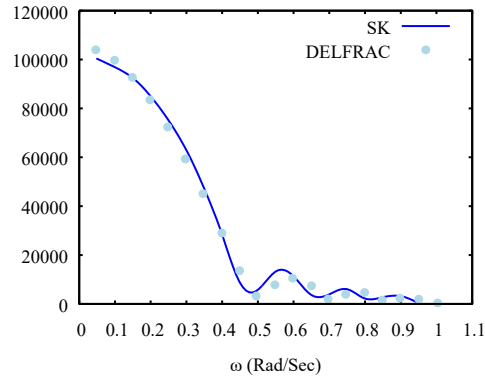


Figure 17 3D Heave Forcing Amplitude and Phase, Heading = 30° – Triangle Barge

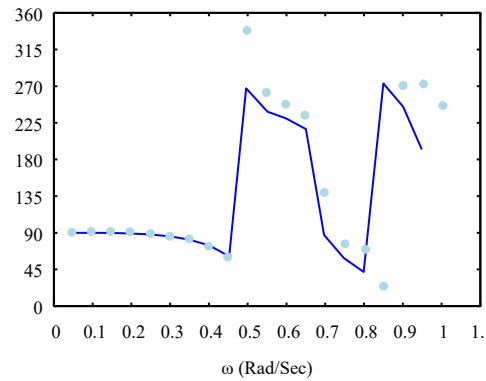
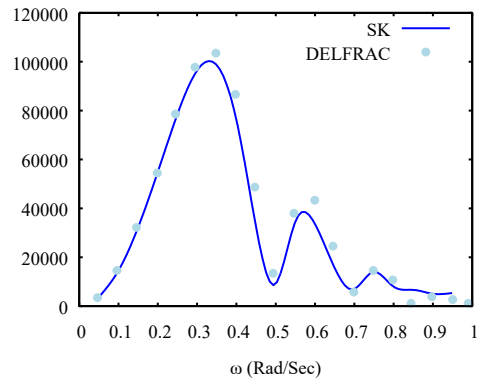


Figure 18 3D Roll Moment Amplitude and Phase, Heading = 30° – Triangle Barge

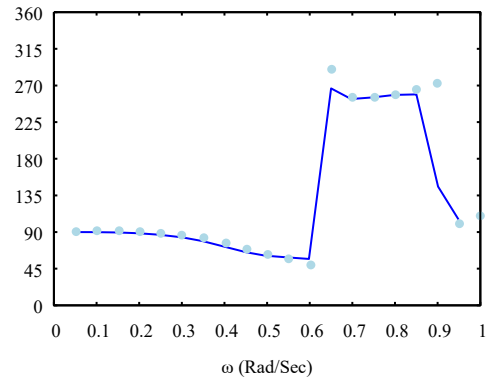
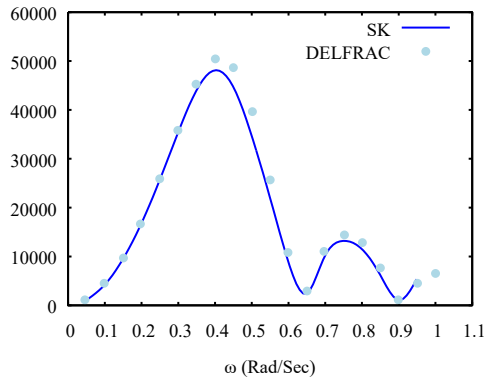


Figure 19 3D Sway Forcing Amplitude and Phase, Heading = 60° – Triangle Barge

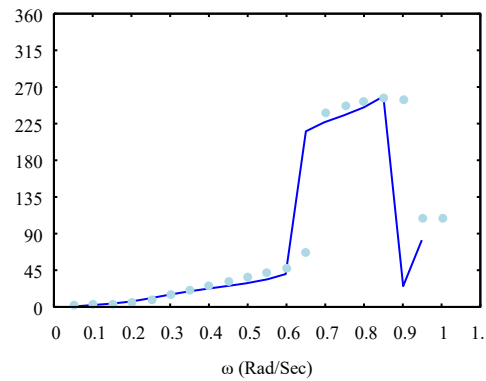
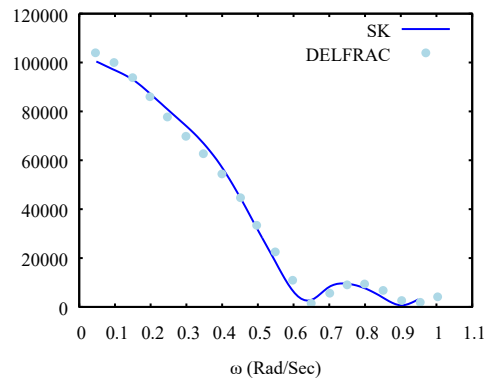


Figure 20 3D Heave Forcing Amplitude and Phase, Heading = 60° – Triangle Barge

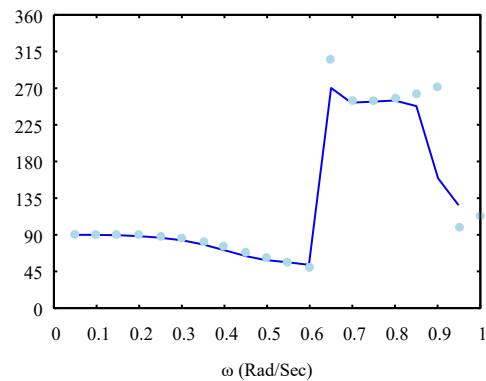
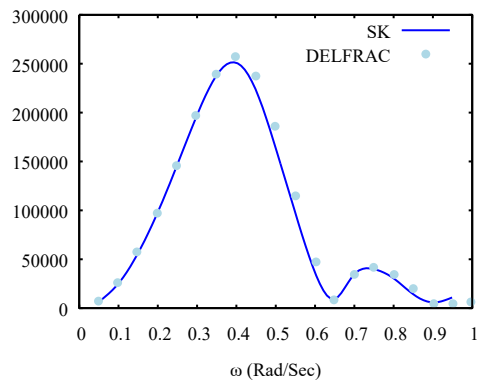


Figure 21 3D Roll Moment Amplitude and Phase, Heading = 60° – Triangle Barge

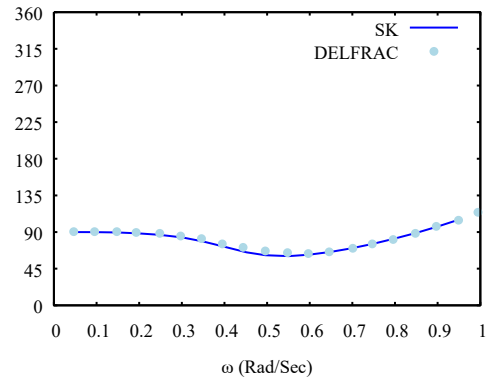
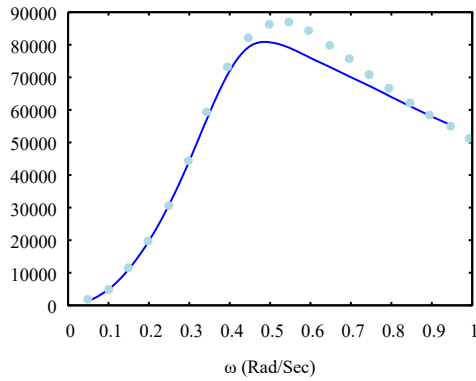


Figure 22 3D Sway Forcing Amplitude and Phase, Heading = 90° – Triangle Barge

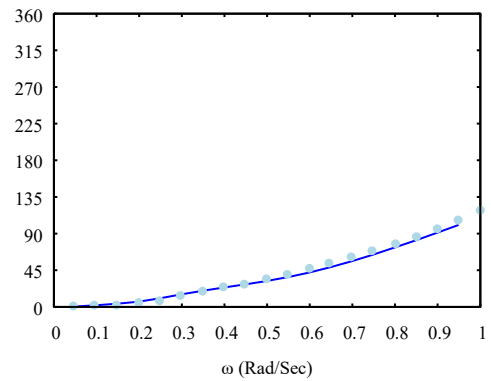
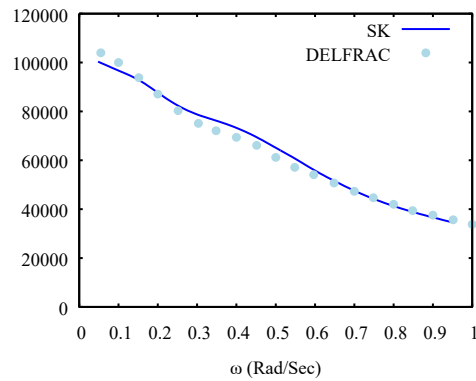


Figure 23 3D Heave Forcing Amplitude and Phase, Heading = 90° – Triangle Barge

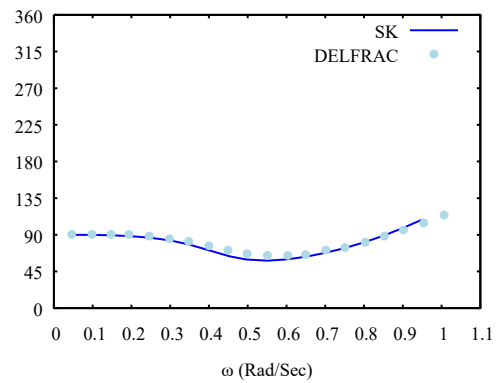
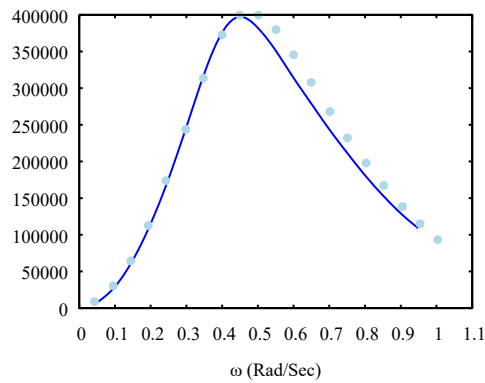


Figure 24 3D Roll Moment Amplitude and Phase, Heading = 90° – Triangle Barge