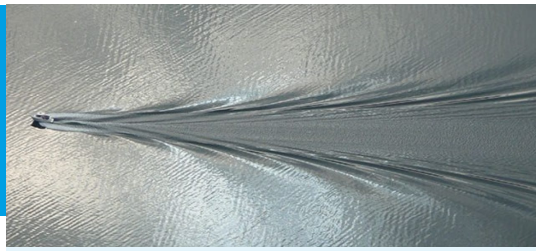
amcsearch.com.au
(03) 6324 9850
phone Int: +61 3 6324 9850

VESSEL GENERATED WAVES
WAVE WAKE PREDICTOR



COURSE DATES:
1 Week full access to the Wave Wake Predictor | Online | $500

1 Month full access to the Wave Wake Predictor | Online | $1,500

All ships and boats generate a pattern of waves when they move, and the characteristics of these waves alter significantly with changes in vessel speed, hull shape and/or water depth.

The Australian Maritime College (AMC) has been proactively researching boat-generated waves and the effects they can have on surrounding shorelines, maritime structures and other users of the waterways since the mid-1980s.

Key to this research effort has been the development of an empirical tool that can rapidly estimate the characteristics of the waves generated by any vessel and rational methods to assess their potential impact on any specific waterway. These tasks are important during design and planning stages to avoid issues from vessel wave wake.

Development of the Wave Wake Predictor

The Wave Wake Predictor is an empirical prediction tool developed using an extensive series of physical scale model experiments conducted within the hydrodynamic facilities at the AMC between 1996 and 2012. The tool has been validated against full scale trials data for a large range of different vessels, operating over a wide range of vessel speeds and water depths.

All scale model experiments were performed in a wide test basin to capture the waves in both the near- and medium-fields, to quantify wave dispersion and attenuation over lateral distance. The ambitious experimental campaign, in both deep and multiple shallow water depths, produced approximately 15,000 wave cuts, all of which were analysed in a considered and methodical manner. This is essential when considering waves generated by vessels over a wide range of practical vessel speed and water depth zones (involving sub-critical, trans-critical and super-critical depth Froude numbers).

Validation of the output from the Wave Wake Predictor has involved full scale trials data for approximately thirty different vessels, covering a wide range of vessel types, speed ranges and water depths. This includes a variety of commercial vessels, for example catamaran ferries ranging from 20 to 40 m length overall, and recreational craft (such as typical aluminium runabouts, wake boats, ski boats, jet skis, etc).

Two versions of the Wave Wake Predictor exist: the ‘original’ version (available online at this website), and a ‘developmental’ version held at AMC. The capabilities of the latter version are continually enhanced, such as: (a) expanding the range of applicable vessel types and sizes (including ‘extremes’ such as wake boats for wakesurfing and other recreational craft), and (b) estimating the effect that other relevant factors have on the characteristics of the waves generated, such as (but not limited to):

- the effect when a vessel accelerates or decelerates;
- the effect of narrow river or shipping channels (lateral banks);
- the effect of varying bathymetry, and;
- the effect of a manoeuvring (turning) vessel.

Please refer to the following publications for further details on the background and development of the prediction tool:

Macfarlane GJ, Bose N, Duffy JT, 'Wave wake: focus on vessel operations within sheltered waterways',

Journal of Ship Production and Design, 30, (3) pp. 109-125. ISSN 2158-2866 (2014)

Macfarlane GJ, 'Wave wake: focus on vessel operations within sheltered waterways', Doctor of Philosophy thesis, Australian Maritime College, University of Tasmania, 2012.

The above research articles and other relevant publications on the topic of vessel generated waves authored by AMC personnel can be downloaded in the tab "Research Publications" below.

Wave Wake Characteristics and Assessment

The Wave Wake Predictor provides the characteristics of the most significant waves within the vessel generated wave train. Prior to the early 2000's it was common to quantify a vessel's wave wake using the characteristic(s) of just a single wave within the entire wave train, usually the highest. However, multiple researchers in the field, such as Macfarlane (2012) have shown that this is inadequate, particularly when considering craft operating in shallow water, which is very common for vessels operating in sheltered waterways. As a result, it is highly recommended that the waves with (i) the greatest height, (ii) the longest period, and (iii) the greatest energy should be identified and considered in any assessment. In some circumstances, it is possible for one single wave to possess all three of these attributes; however, this is very rare for vessels operating in shallow water. To ensure that all potentially damaging waves are identified and considered in any assessment, the following three key waves have been defined:

- Wave A – is defined as the leading diverging wave, which is the wave that will possess the longest period.
- Wave B – is defined as the most significant wave following the leading wave (Wave A). The period will be shorter than the leading wave, but often not by a large margin, whereas the height is very often greater than the leading wave.
- Wave C – it is common for a group of short period divergent waves to be generated and Wave C is defined as being the highest wave within this group. This wave always follows Waves A and B, hence will possess the shortest wave period of these three key waves.

The online version of the Wave Wake Predictor provides predictions of the height, period and angle for each of these three waves.

Use of the Wave Wake Predictor

The online version of the Wave Wake Predictor can be accessed by clicking on the join waitlist button.

Please note, your request to access the tool will be actioned during business hours, Monday - Friday 08:45am - 05:00pm AEST.

If you require a different amount of time to access the tool. Please email AMCS.Courses@utas.edu.au.

Wave Wake Consultancy Services

AMC Search provides expert independent advice on topics related to vessel generated waves. Services range from general enquiries to complete studies. Projects may require full scale trials data, model scale experimental data, and/or empirical predictions using the 'developmental' version of the Wave Wake Predictor held at AMC, where the limits of applicability for type of vessel, speed and water depth are wider than the online version. Typical studies include comparisons between different vessels, effect of water depth (constant and varying) and lateral restrictions (riverbanks, shipping channels, etc).

To enquire about services offered in this field, please contact us at:

wave.wake.predictor@amc.edu.au

gregorm@amc.edu.au

Limitations

Whilst every effort has been taken during the development of the Australian Maritime College Wave Wake Predictor Tool to make it as accurate and precise as possible, it is important the user understands the calculations are an estimated only based on information provided by the user. It does not constitute that the results will be replicated in actual conditions. The User is responsible for any decisions taken, and no liability whatsoever will be taken by AMC Search and the developers/authors.

COVID-19 VACCINATION

AMC Search (AMCS) is operating a COVID-Safe campus aligned with the protocols and procedures established by the University of Tasmania. The safety and wellbeing of staff, students and the broader community is an absolute priority for the University of Tasmania.

We strongly encourage everyone to remain up to date with their COVID-19 vaccinations but no longer require our students to be vaccinated to come to our university campuses, facilities or events.

PAYMENT OPTIONS

Payment methods accepted:

- Register now and pay later (payment required 15 days before the course starts)
- Credit Card (online or via (03) 6324-9850)
- Bank Deposit
- Company sponsorship.

Detailed payment options are available here.

REGISTRATION TERMS

Face to face courses

Cancellations up to 15 working days prior to the scheduled date will be accepted without penalty. Cancellations less than 15 working days will be subject to 100% cancellation fee.

AMC Search reserves the right to cancel the course 15 working days prior to the scheduled date if insufficient registrations are received. Any fees paid for cancelled courses will be refunded in full.

When making flight bookings please ensure you book on a fully refundable basis.

Online courses

Payment of course fees, or authorisation to invoice from your company, is required before access to the online learning environment is provided. Please note, it will take between 2-4 business days to provide your access to the online course if you have not studied previously with AMC Search, the Australian Maritime College or the University of Tasmania.

RESEARCH PUBLICATIONS

Macfarlane, G.J., Bose, N. and Duffy, J.T., 2012, 'Wave wake: focus on vessel operations within sheltered waterways", Proceedings of the SNAME Annual Meeting, Providence, Rhode Island, 24-26th October 2012

Cox, G., 2020, Vessel wave wakes – new perspectives on their generation, propagation and shoreline impacts, Doctor of Philosophy thesis, Australian Maritime College, University of Tasmania, Australia.

Cox, G. and Macfarlane, G.J., 2019, The effects of boat waves on sheltered waterways – Thirty years of continuous study, Proc. Australasian Coasts and Ports Conference 2019, 10-13 September 2019, Hobart.

Macfarlane, G.J., Graham-Parker, K. and Connellan, M., 2019, The increase in wave wake

characteristics of marine vessels when accelerating, Proceedings of the ASME 2019 38th International Conference on Ocean, Offshore and Arctic Engineering OMAE2019, June 9-14, 2019, Glasgow, Scotland.

Macfarlane, G.J. and Graham-Parker, K., 2019, Marine vessel wave wake: transient effects when accelerating or decelerating, Journal of Waterway, Port, Coastal, and Ocean Engineering, 145 (1) Article 04018027, doi:10.1061/(ASCE)WW.1943-5460.0000478 ISSN 0733-950X.

Macfarlane, G.J., 2012, Marine vessel wave wake: focus on vessel operations within sheltered waterways, Doctor of Philosophy thesis, Australian Maritime College, University of Tasmania, Australia.

Macfarlane, G.J., 2009, 'Correlation of prototype and model scale wave wake characteristics of a catamaran', Marine Technology, SNAME, vol. 46, no. 1.

Macfarlane, G.J., Cox, G. and Bradbury, J., 2008, 'Bank erosion from small craft wave wake in sheltered waterways', RINA Transactions, Intl. Journal of Small Craft Technology, part B, 150 (B2) pp. 33-48.

Macfarlane, G.J., 2006, 'Correlation of prototype and model wave wake characteristics at low Froude numbers', RINA Transactions, Intl. Journal of Maritime Engineering, part A2.

Macfarlane, G.J, 2023 'Quantifying the Waves Generated by Vessels Operating in Sheltered Waterways, Proceedings of the Australian Coasts & Ports Conference, 15-18 August 2023, Sunshine Coast, QLD.