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Muff, Darren G. *Electromagnetic ray-tracing for the investigation of multipath and vibration signatures in radar imagery*. Diss. UCL (University College London), 2018.

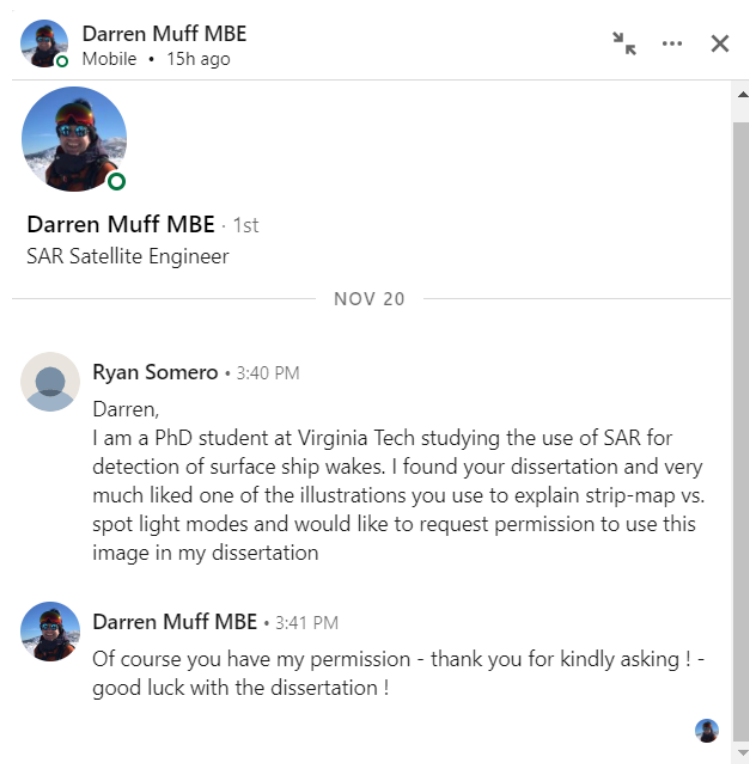


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1 message

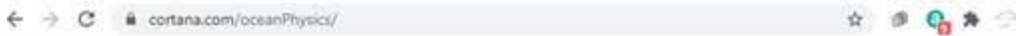
**Somero, Ryan** <[John.R.Somero@hii-nns.com](mailto:John.R.Somero@hii-nns.com)>  
To: John Ryan Somero <[jsomero@vt.edu](mailto:jsomero@vt.edu)>

Wed, Dec 2, 2020 at 4:20 PM

**From:** Christopher Moore [<mailto:cmm@cortana.com>]  
**Sent:** Wednesday, December 2, 2020 3:30 PM  
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**Cc:** KJ Moore <[kj@cortana.com](mailto:kj@cortana.com)>; Timothy Boyce <[tboyce@cortana.com](mailto:tboyce@cortana.com)>; Eric Paterson <[egp@vt.edu](mailto:egp@vt.edu)>  
**Subject:** EXT:Figure 3 from Cortana's Website

Dear Ryan:

KJ remembers clearly giving you verbal permission to use Cortana's Figure 3 from our website (as shown in the image below) in your PhD Thesis.



In the case of a slower moving ship, a smaller percentage of the energy expended through propulsion is necessary to overcome the wavemaking component of the total drag as the drag current generated by the hull due viscous drag becomes relatively more significant at slow speed. Flow in the drag component of the ship wake is in the direction of ship travel, which is opposite to the jet (thrust) current and it is located outside of the thrust jet. This "duplex" structure of the ship thrust and drag currents, when interacting with the ambient surface waves, will generate two pairs of LTC: an inside or thrust generated pair and an outside or drag pair, as shown schematically in Figure 3. Here the outside pair is generated by the interaction of the long surface waves with drag component of the wake, which is reduced relative to the thrust component, which must also overcome the drag due to wave making. The Kelvin wave field is not shown for clarity and simplicity in the LTC schematic.

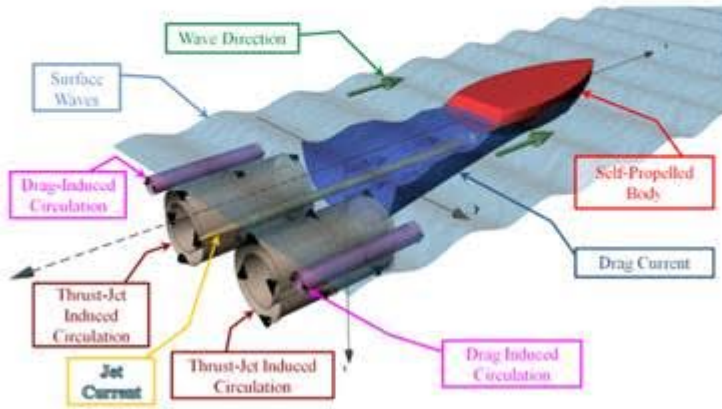


Figure 3. Schematic of the two pairs of LTC (Kelvin wave field not included)

Ryan Somero - you have Cortana's permission to use the "Schematic of the formation of Langmuir-type circulations" in your November 2020 PhD Dissertation as shown in the image below.

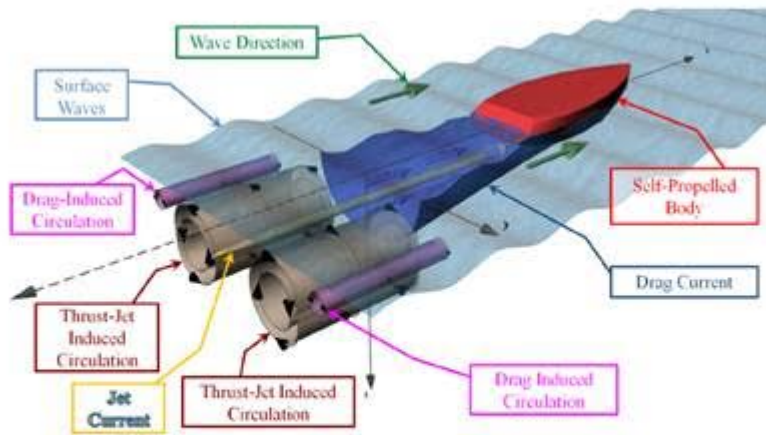


Figure 2.7: Schematic of the formation of Langmuir-type circulations[25]. [used with permission]

If any clarifications are needed, please do not hesitate to contact us – **and Congratulations!!**

Best regards,

**Christopher M. Moore**

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## Permission for Figure 2.9



Ryan Somero <jsomero@vt.edu>

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### ERIM

3 messages

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**Somero, Ryan** <John.R.Somero@hii-nns.com>  
To: John Ryan Somero <jsomero@vt.edu>

Thu, Dec 10, 2020 at 4:27 PM

<https://apps.dtic.mil/sti/pdfs/ADA221563.pdf>

- An enhanced form of Figure 10.

<https://apps.dtic.mil/dtic/tr/fulltext/u2/a272901.pdf>

- Figure 7

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**Ryan Somero** <jsomero@vt.edu>  
To: mwienert@mtu.edu

Thu, Dec 10, 2020 at 4:32 PM

Ms. Wienert,

Thank you for taking my call this afternoon. Again, I am a PhD student at Virginia Tech studying the persistence of surface ship wakes. There are two reports from ERIM that I would like to use images from. Could you please see if I could receive permission to use the two figures below?

Respectfully,

Ryan Somero

[Quoted text hidden]

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**Michelle Wienert** <mwienert@mtu.edu>  
To: jsomero@vt.edu

Thu, Dec 10, 2020 at 5:06 PM

Dear Ryan,

Dr. Robert Shuchman approves the use of the images from the reports listed below. Let me know if you have any questions.

Kind regards,

Michelle

---

Michelle Wienert  
Research Scientist  
MTRI  
Michigan Technological University  
\*\*\*

3600 Green Ct., Ste. 100  
Ann Arbor, MI 48105  
\*\*\*

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From: **Robert Shuchman** <shuchman@mtu.edu>  
Date: Thu, Dec 10, 2020 at 4:44 PM  
Subject: Re: ERIM  
To: Michelle Wienert <mwienert@mtu.edu>

approved

On Thu, Dec 10, 2020 at 4:38 PM Michelle Wienert <[mwienert@mtu.edu](mailto:mwienert@mtu.edu)> wrote:

Hi Bob,

Do you want to give your permission to Ryan to use the images listed below? Your name is listed on a ship-wake report from the 90's at ERIM.

Thanks,  
Michelle

---

Michelle Wienert  
Research Scientist  
MTRI  
Michigan Technological University

\*\*\*

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Ann Arbor, MI 48105

\*\*\*

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