

23rd Internetseminar  
“Evolutionary Equations”  
Workshop Opening  
~~Bundeshöhe Wuppertal~~

Internet at Zoom!

Christian Seifert, Sascha Trostorff, and Marcus Waurick

TU Hamburg, CAU Kiel, and U Strathclyde

June 2020

Sponsor: VW Stiftung

# About the Internet Seminar

Held the 23rd time; extensive list can be found here:

<http://www.math.kit.edu/iana3/seite/isem/>

Initiated 1997/1998 by Rainer Nagel with a focus on Time-Dependent PDEs / Operator Theory

# A brief history of Evolutionary Equations I

MATHEMATICAL METHODS IN THE APPLIED SCIENCES

*Math. Meth. Appl. Sci.* 2009; **32**:1768–1803

Published online 5 January 2009 in Wiley InterScience

(www.interscience.wiley.com) DOI: 10.1002/mma.1110

MOS subject classification: 35 F 10; 35 A 22; 35 Q 99; 46 L 60; 47 B 25; 47 F 05; 47 G 20; 35 K 90; 35 L 90

## A structural observation for linear material laws in classical mathematical physics

Rainer Picard\*,†

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## A structural observation for linear material laws in classical mathematical physics

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*Theorem (Solution theory)*

Let  $(M(z))_{z \in B_{\mathbb{C}}(r,r)}$  be a holomorphic family of uniformly bounded linear operators on  $H$ ,  $v \geq 1/2r$ , satisfying

$$\bigvee_{c \in \mathbb{R}_{>0}} \bigwedge_{z \in B_{\mathbb{C}}(r,r)} \Re(z^{-1}M(z)) \geq c$$

and  $A$  skew-self-adjoint in  $H$ , then we have for every  $f \in H_{v,0} \otimes H$  a unique solution  $(U, V) \in (H_{v,0} \otimes H)^2$  of the problem

$$\partial_0 V + AU = f$$

$$V = M(\partial_0^{-1})U$$

Moreover, the solution depends continuously on the data in  $H_{v,0} \otimes H$  and is causal in the sense that as long as  $f$  is zero, so are  $U$  and  $V$ .

Picard's  
Theorem

# A brief history of Evolutionary Equations II

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- ▶ Idea: Try to find a unified solution theory for boundary value problems of mathematical physics; including the paradigmatic case of Maxwell's equations.

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- ▶ Idea: Try to find a unified solution theory for boundary value problems of mathematical physics; including the paradigmatic case of Maxwell's equations.
- ▶ 2009-article has  $\geq 100$  citations on Google scholar, forms foundation of 4 PhD theses and 2 Habilitation theses, numerous research articles, and one Internet seminar

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- ▶ plenty of in-official evening sessions
- ▶ online board game sessions e.g. at <https://en.boardgamearena.com>

Use forum!

A handwritten note in blue ink that says "Use forum!". A large curly bracket on the left side of the note spans from the "some music ?" item down to the "online board game sessions" item. An arrow points from the right side of the note towards the "online board game sessions" item.

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- ▶ Booklet (including workshop programme all times are CWBT) in the forum

CWBT ... Current Wuppertal Bundeshöhe Time

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*Tell us, what you like, dislike, learned, can be improved etc.*  
We will look into this **every** day.  
Please send us feedback!

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- ▶ Applaud after the talk

*Enjoy!*

Next talk is 9:15  
by Reiner Piard