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ISWIM
International Society for Weigh in Motion

ISWIM NEWSLETTER

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Message from the ISWIM president

ISWIM Members and Friends,

Welcome to the second edition of our Newsletter for 2021.

ISWIM produces this Newsletter to inform its membership and the broader community about the developments within the association and to provide a snapshot of the world of WIM. The Newsletter also provides a forum for the exchange of ideas.

On-behalf the Board, I would like to congratulate our ISWIM Young Researcher Award recipients for 2021, namely Amin Moghadam from Virginia Tech, USA and Lucas Franceschi from Universidade Federal de Santa Catarina (UFSC), Brazil.

We also welcome new vendor and consultant companies to ISWIM, namely Dynaweigh, General Electrodynamics Corporation, Static Motion and FIMAU.

The Newsletter provides a forum for the exchange of ideas, and in this edition, we have articles across the globe highlighting advances and innovation within weigh – in – motion. The innovations are in research initiatives and industry advances and adaptations. All these are driven by end-user needs and the increasing expectations.

I invite you all to contribute to the Newsletter. The ISWIM Newsletter is your newsletter and your articles, research initiatives, programs and learnings are very welcomed.

Thank you all for your contribution.

Chris Koniditsiotis
President – ISWIM

■ Chris Koniditsiotis | ChrisK2.0@bigpond.com

Young Researcher Award 2021

The selection committee of the ISWIM Young Researcher Award 2021 is pleased to announce that two very qualified candidates were selected for the 2021 award. The awardees are Amin Moghadam from Virginia Tech, USA and Lucas Franceschi from Universidade Federal de Santa Catarina (UFSC), Brazil. The award will be granted to the winners at the next ISWIM conference in Australia scheduled for 2023.

Amin's work is on integration of traffic and structural health monitoring systems using extended Nothing-On-Road (NOR) Bridge-Weigh-In-Motion (BWIM) system and Lucas's work is on development of a combined approach for assisted high speed HS-WIM equipment placement in road networks considering evasion coverage. We congratulate the awardees on their excellent work and look forward to future contributions by them in the field of WIM.

Lily Poulikakos ■ Lily Poulikakos | Lily.poulikakos@empa.ch
Chair ISWIM Young Researcher Award Committee.

ISWIM Virtual Workshop, 17th June 2021

On June 17th, 2021 ISWIM held a virtual educational workshop entitled 'An Introduction to Weigh-In-Motion'. It provided training to users of WIM systems and data who are new to the industry and served as preparation for participants of NaTMEC 2021. The workshop was supported by the FHWA, NaTMEC and TRB WIM-subcommittee.

The event saw more than 50 participants and was moderated by Steven Jessberger (FHWA, USA). Chris Koniditsiotis (president of ISWIM, AU) started with a short introduction of ISWIM. He stressed the unique benefits of using WIM data and the role of ISWIM in bringing together users, vendors and researchers of WIM technologies and applications. Next Hans van Loo (Corner Stone Int., CH) gave an overview of the various applications of WIM based on the ISWIM User Guide. He went on to explain the 5 five steps in the selection of the right WIM system to suit your application(s) and conditions. Olga Selezneva (Applied Research Associates, USA) presented the FHWA WIM Pocket Guide and focused on the selection of WIM site locations. She also explained the importance of proper calibration of WIM systems and quality checks for WIM data.

Deborah Walker (FHWA, USA) presented the end-user experiences with the collection and use of WIM data in Long Term Pavement Performance (LTPP) Program. She showed the LTPP-approach for system installation, calibration, data collection and verification of data quality criteria. Finally Malcolm Jones (Driver and Vehicle Standards Agency, UK) showed the use of WIM data in preselection for weight enforcement in the UK. He focused on the benefits of using WIM systems for weight enforcement and the practical lessons learned. The workshop was concluded with a lively Q&A and discussion.

Disclaimer

The projects described, ideas shared, and claims made in this Newsletter do not necessary represent the official view or position of ISWIM.

While care has been taken in the preparation of the content of this Newsletter, ISWIM accepts no responsibility in its use, for any omission, or damage that may be caused and does not endorse any specific product presented in the Newsletter.

ISWIM Website

Please visit the official ISWIM website: www.is-wim.net. Here you will find information on the society, all Newsletters, past ISWIM Events, the Guide for Users of WIM and links to our all Vendors & Consultants.

New is our online, searchable library with over 300 articles, papers and reports related to Weigh-In-Motion.

ISWIM LinkedIn Group

Besides the new ISWIM website and the periodical Newsletter there is another way of keeping up to date with the latest developments in Weigh-In-Motion; the ISWIM LinkedIn Group.

In this group, researchers, end-users and vendors can find AND post short articles on initiatives, new projects, test result, or other developments related to WIM-technology, applications and data.

The ISWIM LinkedIn Group has currently more than **300** members. If you want to join, please visit:
linkedin.com/groups/13400438

In case you were not able to participate in the workshop please visit the www.is-wim.net website for all the presentations (video and slides). If you have ideas for topics for future ISWIM workshops, please send an email with your suggestions to: info@is-wim.net or contact:

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■ **Hans van Loo** | hans.vanloo.int@gmail.com

The importance of portability in WIM systems

Bridge weigh-in-motion systems can be installed, deinstalled and moved to another location very quickly. At the end of 2020, Cestel pushed the notion of B-WIM system's practicality even further by successfully finishing a project in Serbia, where 17 two-week traffic load measurements were completed in less than three months. The owner of the road network, the Public enterprise roads of Serbia, was thus given a quick overview of the real traffic loads across the country, which is an important information for future road planning, maintenance and law enforcement authorities for whom the statistics on overloaded lorries is of crucial importance.

Installation of a Cestel Bridge WIM system in Serbia.

Due to the short time frame of the project, five SiWIM MkIV B-WIM system were used simultaneously. They were installed by two two-man team of Cestel's field technicians, which on average took eight hours to install a B-WIM system. When a 14-day measurement on a particular bridge was finished, system was de-installed, loaded into a van and transferred to a new location in the same day. Since the data gathered by SiWIM is accessible on-line, a traffic expert started preparing a traffic analysis report immediately after the measurement was completed.

The project in Serbia showcased practicality and cost-effectiveness of bridge weigh-in-motion systems when it comes to quickly mapping distribution of the traffic loading over large parts of road network. This is especially important for countries, which are just beginning to invest in WIM technology, and can thus get a fast overview of hotspots where overloaded lorries have the largest impact on the road surface.

■ **Matija Mavrič** | matija.mavric@cestel.si

Coming Events
(subject to change)

South African Transport Conference
Pretoria, South Africa
5-8 July 2021
www.satc.org.za

HVTT16
Qingdao, China (virtual event)
7-9 September 2021
www.hvttforum.org

ITS World Congress 2021
Hamburg, Germany
11-15 October 2021
www.hamburg.com/business/its

Gulf Traffic
Dubai, UAE
6 - 8 December 2021
www.gulftraffic.com

Intertraffic Amsterdam
Amsterdam, the Netherlands
29 March – 1 April 2022
www.intertraffic.com

NaTMEC 2022
Idaho, USA
13-16 June 2022
www.natmec.org

ISWIM 3rd Regional Seminar
Pretoria, South Africa
6-8 July 2022
www.is-wim.net

ITS Central Eastern Europe
Kazan, Russia
19-21 September 2022
www.itsinceeurope.com

Transport Research Arena
Lisbon, Portugal
14-17 November 2022
www.traconference.eu

ICWIM-9
Melbourne, Australia
2023 (dates to be decided)
www.is-wim.net

For other WIM-related events contact:
■ **Hans van Loo** | hans.vanloo.int@gmail.com

New date for the 3rd Regional ISWIM Seminar

Due to the worldwide COVID situation, ISWIM has decided to postpone the 3rd Regional ISWIM Seminar 'Optimising Road Freight Transport using WIM Data'. The seminar will now be held from the 6th to the 8th of July 2022 at the same location, namely the CSIR Convention Centre in Pretoria, South Africa. ISWIM has joined forces with the Southern African Transport Conference (SATC).

The 40th edition of the SATC will be held from 4-7 July 2022 in the same venue, hence right before and in parallel with the ISWIM Seminar. Further information on the SATC can be found on: www.satc.org.za.

The 3rd Regional ISWIM Seminar has a specific focus on Sub-Saharan Africa. Several countries in this region have been using WIM systems for many years, while others have only recently started implementation. By bringing all these users together ISWIM wants to support the development of WIM in Southern Africa. The hosts of the seminar are ISWIM, PIARC Technical Committee TC2.3 'Freight' and Mikros Systems, with the support of the ITS South Africa, South African Road Federation, SANRAL, World Bank, ASANRA, CSIR, FEHRL, IRFTT/HVTT, Namibian Road Agency, Bakwena, N3TC, Trac-N4 and the Cross Border Agency.

Famous Jacaranda trees in Pretoria, South Africa.

The seminar will cover the following topics concerning in-road and on-board Weigh-In-Motion:

- Recent advances in WIM systems, sensors, applications, implementation, operation and testing;
- Practical experiences with the implementation and operation of WIM systems and use of vehicle mass data in Sub-Saharan Africa for different applications;
- Use of WIM data for pavement and bridge engineering, pre-selection for weight enforcement, direct enforcement and tolling by weight;
- Use of mass information in innovations in road transport logistics, Performance Based Standard (PBS), Road Transport Management System (RTMS) and on-board vehicle approaches.

For more information on submission of abstracts, registration, exhibition and sponsoring please visit: www.is-wim.net or contact:

■ **Andy Lees** | Andrew.Lees@q-free.com
■ **Andrew Houliston** | Andrew@syntell.co.za
■ **Chris Koniditsiotis** | ChrisK2.0@bigpond.com

New ISWIM Vendors

Dynaweigh, the owner managed company Batsch Waagen EDV GmbH is dealing with weighing technology for more than 40 years. About 10 years ago we faced a new challenge – „Weighing in Motion" – the control of vehicles on a dynamic road vehicle scale – while passing. The result of decades of trials and development are the patented dynamic axle load scales HHB01 and HHB02 with legal verification with an accuracy of +/-1%.

Both scales are since 2018 in continuous operation at the traffic control station on the Austrian A5 motor highway near Schrick. This serves the traffic safety and the road maintenance. Finally we are looking for distribution partners and licenses worldwide.
www.dynaweigh.com

General Electrodynamics Corporation
General Electrodynamics Corporation (GEC), a world leader, has been investing in the "heavy-duty, portable" weighing industry segment since 1957. Manufacturing and corporate offices located in Arlington Texas, carry current "certifications" that include AS9100D and ISO9001 reflecting their commitment to the highest levels of engineering design, product manu-facturing and quality benchmarking. GEC's product longevity, organizational brand and international reputation spans to over 140 countries.

It has authorized service centers in Singapore, Israel, China, UK, Australia and Texas, giving any GEC customer world-wide access to tear-down inspect, repair, and recalibration facilities nearby. For more information go to: www.gecscales.com

Recent Cross WIM installations in Bulgaria

In May, Cross delivered an installation for weighing in motion took place. This time it was installed in the Bulgarian city of Plovdiv, the second largest city in Bulgaria, which stands on the banks of the Maritsa River in the historical region of Thrace.

In cooperation with a local university of more than 13,000 students, one of six universities in the city, various types of sensors are being tested and their reliability and accuracy are being recorded. The project also includes a comparison of different types of cameras for reading vehicle registration plates from different suppliers.

Installation of Cross WIM system in Bulgaria.

The main advantages of the high-speed Weigh-In-Motion system are the obtained data about the vehicle, the measured dimensions of the vehicle, ie. height, width and length, information on possible double tyiring and vehicle speed measurement. A web application for data and SQL database integration is a certainty.

The installation is considered to be quite demanding, with a full six lanes of different sensors and different technologies are included. We are implementing this event with the partner company Kontrax.

■ Simona Kovaříková | kovarikova@cross.cz

Study on Nothing-On-Road Bridge WIM in USA

Researchers at Virginia Tech and American University of Sharjah, led by doctoral student Amin Moghadam, Dr. Rodrigo Sarlo, and Dr. Mohammad AlHamaydeh, are designing an integrated structural health monitoring (SHM) system with nothing-on-road (NOR) bridge-weigh-in-motion (BWIM) system for both structural integrity and traffic monitoring applications. Leveraging a single network of strain gages for two tasks can significantly reduce overall costs and result in a more holistic design to instrumented bridges.

New ISWIM Consultants

Static Motion is a South African consulting engineering company based in Pretoria. We specialise in overloading monitoring projects, with a keen interest in the calibration and quality management of WIM data. We currently serve all three of the major toll road concessionaires in the country and look after approximately 70 WIM lanes. We also participate in WIM-related research and development of standards for the South African National Roads Agency.

Our range of services include technical specifications for procurement of WIM services, site selection and inspections, contract management, data processing, WIM calibration and data quality management.
www.staticmotion.co.za

FIMAU s.r.o. offers and provides consultancy in the area of intelligent traffic systems, smart technology, non-destructive testing and other advisory services since 2010. It has a long-term experience in weigh-in-motion (WIM), detecting and monitoring of vehicles and traffic flow.

Solutions include measurement vehicles in motion, bridge WIM, traffic and WIM data processing and evaluation, traffic monitoring and control, central control systems, smart technology and smart cities, intelligent mobility, construction and infrastructure projects. WIM applications range from statistical data measurement to overloaded vehicles pre-selection in free flow of vehicles. Possibility of toll by weight and direct enforcement can also be developed. www.FIMAU.com

The NOR-BWIM approach uses the instrumented bridge as a platform to find the velocity, number of axis, axle spacings, axle and gross weights, and the position of the trucks while nothing is installed on the road surface. Thus, this system avoids many issues associated with traditional BWIM systems, such as lane closure, traffic disruption, and extends the durability of the monitoring system.

NOR Bridge WIM system installed in Virginia, USA.

In this study, we contribute a detailed experimental study on two long-span concrete-box-girder bridges, Virginia Tech Transportation Institute Smart Road and Varina-Enon bridges, in an effort to ascertain whether or not NOR-BWIM systems would still work effectively on such bridges. In particular, we demonstrate the importance of proper sensor placement on performance, something not carefully considered in the few existing NOR BWIM studies on similar bridges. This opens up the potential of leveraging localized strain behavior for future NOR BWIM applications. The study is currently aiming to address some of the current challenges associated with long-spans such as side-by-side and multiple trucks simultaneously on the bridge, still active areas of research in the NOR-BWIM domain. For more information visit www.vibeslab.cee.vt.edu.

■ **Amin Moghadam** | moghadam@vt.edu

OIML certificate for iWIM – BISON system up to 90km/h

In 2021 the iWIM team can share an important achievement: the BISON Weigh-In-Motion system has obtained an extension of the OIML R134 certification accuracy class 10 for total vehicle weighing up to a speed of 90km /h.

IWIM has worked with NMi, one of the most valued metrology institute in Netherland and Europe, and has passed all the tests accomplished using different types of vehicles (5 axle, 4-axle and 2-axle) necessary to obtain the new certification, which is an extension of the one already obtained in 2017 which certified the product up to 50 km/h. This provides official confirmation that the system accurately measures overall weights of heavy trucks (GVW > 35ton) at speeds of up to 90 km/h.

Coming Events
(subject to change)

South African Transport Conference
Pretoria, South Africa
5-8 July 2021
www.satc.org.za

HVTT16
Qingdao, China (virtual event)
7-9 September 2021
www.hvttforum.org

ITS World Congress 2021
Hamburg, Germany
11-15 October 2021
www.hamburg.com/business/its

Gulf Traffic
Dubai, UAE
6 - 8 December 2021
www.gulftraffic.com

Intertraffic Amsterdam
Amsterdam, the Netherlands
29 March – 1 April 2022
www.intertraffic.com

NaTMEC 2022
Boise, Idaho, USA
13-16 June 2022
www.natmec.org

ISWIM 3rd Regional Seminar
Pretoria, South Africa
6-8 July 2022
www.is-wim.net

ITS Central Eastern Europe
Kazan, Russia
19-21 September 2022
www.itsinceeurope.com

Transport Research Arena
Lisbon, Portugal
14-17 November 2022
www.traconference.eu

ICWIM-9
Melbourne, Australia
2023 (dates to be decided)
www.is-wim.net

For other WIM-related events contact:
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OIML Certified iWIM bending plate WIM system in Italy.

The BISON WIM system is composed of 2 stainless steel bending plates equipped with fiber optic sensors connected to a datalogger. It is particularly stable and reliable in any climatic condition of use, and moreover, the use of optical fiber as a means of communication between the weighing system and the acquisition data logger gives the BISON system the maximum degree of immunity to electromagnetic fields.

High durability and reduced maintenance are the BISON's main strength points, in addition to the easy movement of the bending plates to a new installation site. IWIM believes not only in a durable and reliable product, but also in a more sustainable technology: BISON is a zero waste system, in fact in case of works on the road surface, it will be possible to move the system and then reposition it, which means it is reusable and there is no need to purchase a new one

■ Giada Guerini | giada.guerini@iwim.it

WIM data: A critical input for mapping road network resiliency

A casual glance at a map of the road network in the Canadian Prairie and Northern Region reveals at least two features: (1) the network covers a vast geographic area and (2) certain portions of the network have low redundancy (i.e., few alternative routing options). On their own, these features render the network prone to various risks and hazards (e.g., extreme weather events, flooding), which can disrupt the fluidity of the supply chains fundamental to the region's economy.

A closer look at that map and some related data would further reveal that most roads have low traffic volumes (by international standards), and that to gain a better understanding of the importance of a resilient road freight transport system, we need a more systematic way of answering some basic questions:

- How many trucks are out there? Where are they? When do they travel?
- What type of trucks (axle configurations, trailer arrangements, body types) are most commonly utilized and for what purposes?
- How heavy are those trucks?

ISWIM Vendors

Axtec	www.axtec.co.uk
Batsch	www.dynaweigh.com
Betamont	www.betamont.sk
Camea	www.cameatechnology.com
Captels	www.pesage-captels.com
Cestel	www.cestel.eu
Ciemsa	www.ciemsa.com.uy
Cross	www.cross.cz
Dynaweigh	www.dynaweigh.com
ECM	www.ecm-france.com
Excel Technology	www.exceltech.com.au
GEC Scales	www.gecscales.com
Intercomp	www.intercompcompany.com
IRD / PAT Traffic	www.irdinc.com
iWIM	www.iwim.it
Kistler	www.kistler.com
Mettler Toledo	www.mt.com
Mikros	www.mikros.co.za
Osmos Group	www.osmos-group.com
Q-free	www.q-free.com/products
Sterela	www.sterela.fr
TE Connectivity	www.te.com
TDS	www.traffic-data-systems.net
Tramanco	www.tramanco.com.au
VanJee Technology	www.wanji.net.cn

Interested to join the ISWIM Vendors, just contact:

■ Andy Lees | andrew.lees@q-free.com

■ Hans van Loo | hans.vanloo.int@gmail.com

WIM system installed in Manitoba, Canada.

In March 2021, Dr. Jonathan Regehr and Dr. Babak Mehran in the Department of Civil Engineering at the University of Manitoba launched a multi-year collaborative research program to build uniquely-Canadian logistics data sets that help answer those questions. With those data sets, the research will also develop and apply a novel methodological framework to evaluate the impact of network disruptions on the performance of the region's road freight transport system. The research, funded by the National Research Council of Canada, includes critical collaborations with International Road Dynamics, Inc. and Manitoba Infrastructure.

- IRD Joins University of Manitoba Research Project

IRD will work with the University of Manitoba on a key component of the Canadian Prairie and Northern Region transportation research project: the development and deployment of a leading-edge mobile (portable) truck traffic and road-weather monitoring facility.

These mobile monitoring systems, the first of their kind in Canada, will be deployed throughout the region to capture data over a period of five years. The systems will be situated at WIM and traffic monitoring sites — that were installed and are maintained by IRD — at locations throughout Manitoba. The monitoring systems will collect simultaneous, associated measurements of traffic, road, and weather conditions at a microscopic geographic scale.

The vision is to use the newly acquired data to fill knowledge gaps about trucking activity throughout the network and to gain a detailed understanding of the impacts of road and weather conditions on the ability of traffic sensors like WIM to measure trucking activity. The data will be used to identify critical network segments and vulnerabilities and the potential impacts of those vulnerabilities on resilience and safety.

Additional information on the project is available on the National Research Council Canada website: Applying artificial intelligence to improve the resilience, fluidity and safety of road freight transport in the Canadian Prairie and Northern Region.

■ **Jonathan Regehr** | jonathan.regehr@umanitoba.ca

■ **Rish Malhotra** | rish.malhotra@irdinc.com

ISWIM Consultants

Corner Stone	www.corner-stone-int.com
FIMAU	www.FIMAU.com
NMi	www.nmi.nl
RTS GmbH	doupal@hispeed.ch
Static Motion	www. staticmotion.co.za

Interested to join the ISWIM Consultants, just contact:

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ISWIM Guide for Users of WIM

The ISWIM Guide for Users of Weigh-In-Motion serves as a basic, yet comprehensive introduction to Weigh-In-Motion. The Guide covers different aspects related to the working, specifying, buying, installing, testing, maintaining and using of WIM systems and data. To enhance accessibility for users starting with WIM, these topics are described in easy-to-understand language.

A PDF version of the WIM User Guide can be downloaded at the ISWIM website: www.is-wim.net.

■ **Hans van Loo** | hans.vanloo.int@gmail.com

Axtec holds unbroken 25-years DVSA contract

Axle weighing specialist Axtec has once again secured the contract to maintain and certify DVSA's national network of 46 roadside enforcement weighbridges, located throughout Great Britain. The Runcorn, UK based company has now held the DVSA contract for an unbroken 25-years, during which time it has dramatically improved the efficiency of routine maintenance and calibration, while significantly reducing downtime across the network.

Axtec arrive to test the DVSA site at Bowdon, UK.

Under the contract, Axtec's team of dedicated Service Engineers will carry out routine six-monthly verification tests using its own vehicles and unique weighbridge test equipment. The purpose-designed truck-and-trailer combination – the only one of its type in the UK – is now supplemented by Axtec's new, 32-tonne 4-axle rigid test vehicle to efficiently deliver highly accurate and reliable results; all with the ultimate outcome of supporting DVSA in keeping operators' vehicles safe, reliable and legal. The contract also includes annual level surveys, to certify that the flat weighbridge approaches are within the stringent limits specified by law. Any remedial work is completed by Axtec's own in-house construction team.

Axtec Managing Director, Keith Gresham, said, "We've been awarded this contract for a sixth consecutive time; testament to our ongoing commitment to quality and performance – for our products and our customer service. We're very proud of this achievement," he said, "it also sets the benchmark and inspires us to maintain the highest levels of quality and service."

■ **Alasdair Littlejohn** |alasdair.littlejohn@axtec.com

Bridge WIM session at IABMAS 2022

The 11th nternational Conference on Bridge Safety and Management (IAB-MAS) will be held from 11-15 July 2022 in Barcelona, Spain. During the IABMAS there will be a special session covering topics regarding Bridge Weigh-in-Motion.

WIM for Direct Weight Enforcement

The June edition of the Traffic Technology International included a very interesting article on the use of WIM for direct weight enforcement, (pages 33-40). The article was triggered by the current revision being undertaken by the International Organization of Legal Metrology (OIML) of the R134 standard relating to WIM.

Several ISWIM experts were asked to give their view on ongoing developments. Chris Koniditsiotis (ISWIM) explained the special requirements for WIM systems for direct enforcement and the need for a globally accepted standard. Rish Malhotra (IRD) described the technical and legal challenges. Olga Selezneva gave a North American perspective on the use of in-road and on-board weighing systems. Tomas Pospisek (Kistler) mentioned the benefits of using high-speed WIM for enforcement and his expectations for the future.

For the full article:
https://tti.mydigitalpublication.co.uk/publication/?m=63358&i=707684&p=32&ver=html5

This special session is titled: SS02 - Bridge Weigh-in-Motion: technology developments and applications for maintenance. It is aimed at studies on the use of alternative sensing technologies (e.g. fibre Bragg, accelerometers), improved algorithms and novel approaches (e.g. machine learning) for BWIM technology.

In addition, this session welcomes investigations on novel applications of BWIM installations and the use of the gathered traffic information towards bridge maintenance. For more information check IABMAS 2022 own website: https://congress.cimne.com/ iabmas2022/frontal/SpecialSessions.

The submission of abstracts is still open and the notification of ac-ceptance of the abstract will be noti-fied to the authors by September 01, 2021.

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