CONFERENCE PROGRAM

2024 15th International Conference on Mechanical and Aerospace Engineering (ICMAE 2024)

with workshop of
The 13th International Conference on Pure and Applied Mathematics (ICPAM 2024)

Zagreb, Croatia, July 17-20, 2024

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Address: Ul. kneza Borne 2, 10000, Zagreb, Croatia

TECHNICAL SESSION

T5/ System Modeling and Computational Mathematics

09:00-10:30, 19 July@ London

Chair: Öznur Özkan Kılıç, *Başkent University, Turkey*

Zagreb Time	ID	Presenter	Affiliation
09:00-09:15	T5-1	Malika Yaici	University of Bejaia
09:15-09:30	T5-2	Nugzar Shavlakadze	Iv. Javakhishvili Tbilisi State University
09:30-09:45	T5-3	Öznur Özkan Kılıç	Başkent University
09:45-10:00	T5-4	Nana Tengiz Odishelidze	Iv. Javakhishvili Tbilisi State University
10:00-10:15	T5-5	Jaeyoung Choi	Soongsil University
10:15-10:30	T5-6	Otar Jokhadze	Iv. Javakhishvili Tbilisi State University

Details

ID	Title and Authors
T5-1	3D Simulation of a TRMS Flight Control Malika Yaici, Amine Ouchene, Mohand-Akli Kacimi
T5-2	The Boundary Value-Contact Problem of Dynamics for Viscoelastic Half- Space with Elastic Inclusion Nugzar Shavlakadze
T5-3	Majorization Results for a Subclasses of Analytic Functions Associated with Ruscheweyh Derivative Operator Öznur Özkan Kılıç
T5-4	The Dynamical Boundary Value Problem for a Bolzano-Volterra Viscoelastic Model Nana Tengiz Odishelidze
T5-5	Optimizing GEMM routine with Data Preloading on Marvell ThunderX2 Enoch Jung, Jaeyoung Choi
T5-6	On the Solvability of Some Boundary Value Problems for the Vibrating String Equation in Rectangular Domains Otar Jokhadze, Sergo Kharibegashvili

Optimizing GEMM routine with Data Preloading on Marvell ThunderX2

Enoch Jung[1] and Jaeyoung Choi[2]

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Abstract: General Matrix-Matrix Multiplication (GEMM) is a fundamental core computation routine in linear algebra of high importance, therefore it should be implemented with highly optimized techniques. CPU vendors provide users with their own well-optimized linear algebra libraries, which are mostly implemented with CPU-specific assembly languages and are undisclosed to the public, however their GEMM routines may have a room for further improvement. In this paper, we present a data preloading technique for GEMM, which loads data (or submatrices) directly into the register from cache or memory before they are required. This preloading technique differs from prefetching, which moves data into the cache from memory. Not only does this technique hide load latency, but it also enables to skip the packing process in certain situations when combined with prefetching. We implemented and optimized our GEMM routine on ARM-based server processor Marvell ThunderX2. The performance on a single core of the ThunderX2 is 16.472 Gflops, representing 100.826% of the performance compared to ArmPL (16.337 Gflops). And the performance on 64 cores is 975.904 Gflops, accounting for 99.541% of the performance compared to ArmPL (980.404 Gflops). In the near future, we will further optimize the routine and also implement it on other architectures such as Intel Xeon CPUs and AMD Ryzen CPUs.

***Keywords*:** preloading, GEMM, ArmPL, ThunderX2

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Certificate

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ICPAM 2024 Conference
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Jaeyoung Choi

Participated in
2024 The 13th International Conference on Pure and Applied Mathematics (ICPAM 2024)
Your oral presentation has been selected as one of the best of this conference

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