

Introduction to the Competition

We are excited to announce the launch of a competition focused on solving industrial problems presented as challenges. This competition, provided in collaboration with one of our esteemed industrial partners, offers a unique opportunity for participants to showcase their problem-solving skills and innovative thinking. Whether you're a seasoned professional or an enthusiastic newcomer, this competition is your chance to make a significant impact in the industrial sector. This competition not only provides a platform for participants to demonstrate their technical skills but also fosters innovation and collaboration within the field. We encourage all interested individuals and teams to participate and contribute their creative solutions to real-world industrial challenges.

The event will be structured in several phases, each designed to rigorously evaluate the effectiveness and creativity of the proposed solutions. We encourage all innovators, problem-solvers, and forward-thinkers to participate and take on this exciting challenge. Below are the detailed rules and phases of the competition:

Competition Rules and Phases

1. Application Phase:

- The list of challenges participating in the competition is available on the conference website at https://motor24.oscsbras.ru/pages/ru_index.html#challenges Additionally, you can obtain it by requesting from the organizing committee via email at jkochet@math.nsc.ru
- Participation in the competition can be either individual or team-based. The team leader submits proposals on behalf of the entire team. Participation in MOTOR2024 is not mandatory.
- Each participant must prepare a proposal addressing one of the challenges.
- The proposal should provide a comprehensive theoretical analysis along and/or an efficient algorithmic solution. It should be presented in 1-2 pages (A4 size), adhering to a free-form style that maintains mathematical correctness throughout.
- Proposals must be submitted via email to jkochet@math.nsc.ru before the MOTOR 2024 international conference. Submission deadline is 30th of June 2024.
- Each participant is allowed to submit no more than one proposal for each challenge.

2. 1st Round Shortlisting:

- All submitted proposals will undergo a preliminary evaluation by the Technical Committee before the Industrial Session at the conference.
- Participants will have the opportunity to present their proposals during the Industrial Session at MOTOR2024, with the option to do so either in person or online. Each presentation will be allocated a time slot of 10-15 minutes.
- The judges of the Technical Committee will evaluate proposals based on a set of comprehensive criteria, that recognizes the theoretical soundness, creativity, practicality, and potential impact of each proposal.
- The Technical Committee will select the top proposals, up to a maximum of eight among all proposals for all challenges.
- Honorable Awards will be announced at the conference's Closing Session, with a total prize pool of 1.2 million rubles to be distributed among the top proposals.

3. 2nd Round Shortlisting:

- Winners from the 1st round are invited to proceed with their research in close collaboration with the industrial partner. They will be required to prepare a detailed proposal that includes preliminary computational results.
- The submission deadline for the detailed proposal is 1st of September, 2024.
- The detailed proposals will be presented at a special meeting organized in September. During this meeting, the Technical Committee will select the top two proposals among all participating in the 2nd round.
- Each of these two winners will be granted an Honorable Award of 500,000 rubles, recognizing their outstanding contributions and innovative solutions.

4. Rule Changes

The research-oriented nature of the competition involves various risks related to the feasibility of tasks, their timelines, and other factors. Therefore, the organizers reserve the right to make changes to the competition rules during its course. All changes will be published in a timely manner, and participants will be duly informed. Special attention is given to the following points:

- We hope the competition will attract increased interest from our industrial partner, potentially expanding the list of challenges.
- If the solutions in the first stage are of sufficiently high quality, the second stage may be skipped, and all awards will be presented at the conference.

5. Challenges

1. Algorithms for single or multi-level optimization with black-box terms.
2. Warm start in Quadratic Programming solver.
3. Parameter optimization for restarted mixed precision iterative sparse solver.
4. Universal rules for suboptimal balls packing or minimized correlation vector frames.
5. Using Large Language Models for Optimization Modeling
6. Loss-Less Network Compression