

Scientific Report for the Calculus of Variations NL Workshop

Summary: The Calculus of Variations NL workshop was the first event under the flagship of the Dutch Calculus-of-Variations (CalcVarNL) community (www.calcvar.nl) with a focus on getting to know each other, exploring common interests in Calculus of Variations and beyond, and charting a course for the future of the CalcVar community in the Netherlands.



The workshop took place on Schiermonnikoog, where a total of 20 (6 senior researchers, 6 junior researchers, 8 PhD students) participants were hosted by Hotel Graaf Bernstorff and the cultural centre De Stag. Hotel Graaf Bernstorff provided shared accommodation and meals for all participants, while De Stag provided the space for the workshop and discussion sessions.

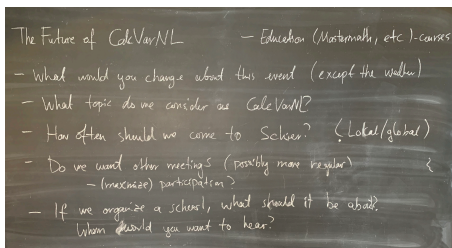
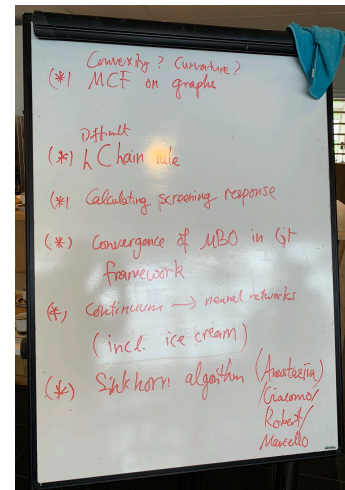
The program consisted of

5 *overview lectures* provided by the workshop organisers on various topics within the Calculus of Variations, including gradient flows, optimal shapes of surface energies, variational models on graphs, gradient flows in the training of neural networks, and sparse optimisation and variational problems in machine learning. As the name suggests, the overview lectures gave a pedagogical introduction to the different fields represented within the Dutch CalcVar community.

6 *research talks* provided by senior researchers connecting CalcVar techniques with other mathematical fields, such as variational calculus in numerical methods for Hamiltonian systems, the regularisation of inverse problems, energy quantisation of integral functionals, in the existence theory for degenerate cross-diffusion models, and dispersive estimates in exterior domains.

7 (short) *PhD talks* highlighting the connection of ongoing research projects with CalcVar.

4 *brainstorm sessions* with intense discussions on technical and open questions. Questions were collected at the start of the first brainstorming session and refreshed at the start of each consecutive session. These sessions were vital to the success of the workshop as they provided the space needed for researchers to recognise and identify the expertise of each other, and have led to prospects for future collaboration.



1 *outlook session* with a focus on future activities within the Dutch CalcVar community. From this session, a monthly reading group organised by PhD students for PhD students all around the Netherlands was recently initiated. Other ideas that came out of this session were collaborations on the level of MasterMath courses and a compilation of CalcVar-related courses offered in universities nationwide as well as the setting up of a mailing list for CalcVar-related activities.

1 *social activity*, which included a hike around the island and a conference dinner on the coast.

All in all, both participants and organisers thoroughly benefited from the workshop and the workshop achieved its purpose of jump-starting nationwide activities within the flagship of CalcVarNL.