<table>
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<tr>
<th><strong>Fellow</strong></th>
<th>Shipra Singh</th>
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<td><strong>Host Organisation</strong></td>
<td>Norwegian University of Science and Technology, Trondheim, Norway</td>
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<tr>
<td><strong>Scientific coordinator</strong></td>
<td>Elisabeth Köbis</td>
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I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During my ERCIM fellowship, I prepared and submitted two manuscripts in the journals, and one is on-going. The details are given below:

First, we examined how changes in the strategy of players over multiple time scales impact the decision making, resulting payoffs and costs in non-cooperative strategic games. We proposed a dynamic generalized Nash equilibrium problem for non-cooperative strategic games which evolve in multi-dimensions and also defined an equivalent dynamic quasi-variational inequality problem.

The existence of equilibria is established and a spot electricity market problem is reformulated in terms of the proposed dynamic generalized Nash equilibrium problem. Employing the theory of projected dynamical systems, we illustrated our approach by applying it to a 39-bus network case which is based on the New England system. Moreover, we illustrated a comparative study between multiple time scales and a single time scale by a simple numerical experiment.

Second, we examined how can we achieve equilibrium when two related non-cooperative strategic games are being played. We proposed a split generalized Nash equilibrium problem for two non-cooperative strategic games and also defined an equivalent split quasi-variational inequality problem. Further, by using the techniques of proving existence of a quasi-variational inequality problem, we established the existence of equilibria. Moreover, as an application, we motivated introduced split generalized Nash equilibrium problem in the terms of river basin pollution problem.

The third subject of the study is to present the novel approach for some important aspects of the split modeling to cooperative games. We defined a split cooperative game and its core, and interpreted two bargaining schemes for points in the core. We showed that provided bargaining schemes have meaningful heuristic interpretations. Moreover, we also motivated the introduced split cooperative game in the terms of a unified model for the pollution control problem. Further, we intend to present some numerical experiments for illustrating the developed bargaining theories.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

5. Worked with Alesund Brannvesen (fire service) (https://aabv.no) at the European Study Group with Industry (ESGI) 156 workshop (https://www.ntnu.edu/imf/esgi-156) which was held in Alesund, Norway on June 13-17, 2022.
IV – RESEARCH EXCHANGE PROGRAMME (REP)