

Analysis of Hibler's sea ice model: well-posedness and time periodic solutions

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In 1979, W. D. Hibler proposed a large-scale dynamic-thermodynamic sea ice model, where sea ice is described as a viscous-plastic material. In this talk, we investigate a regularized version of this model from a mathematical analysis point of view. More precisely, we reformulate the model as a quasi-linear abstract Cauchy problem and elaborate on the differential operator associated to the internal ice stress. This allows us to establish local strong well-posedness as well as global strong well-posedness close to equilibria for a simplified version of the model. Moreover, we study the corresponding time periodic problem and show the existence of time periodic solutions by means of the Arendt-Bu theorem on maximal periodic L^p -regularity. In the last part of the talk, we briefly address the local well-posedness of a more physical parabolic-hyperbolic variant of Hibler's model.

The talk is based on joint work with Tim Binz, Karoline Disser, Robert Haller and Matthias Hieber.