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On modelling biological network formation

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In this talk we present a mesoscopic model for natural network formation processes, acting as a bridge between a discrete and continuous network approach proposed by Hu and Cai. All models describe the pressure field and the dynamics of the conductance network under pressure force effects.

We start by presenting the different approaches and analyze their corresponding properties. We will focus on special stationary solutions of the mesoscopic model including discrete network solutions.

This involves a proper reinterpretation of the system in terms of measure valued solutions. To overcome the arising difficulties, we will also introduce an alternative formulation replacing the nonlinear Poisson equation for the pressure field in the original approach by a linear side constraint.

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