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## On solutions to the reduced plate model with hinged-free boundary conditions

Wednesday, August 14, 2024 2:00 PM (30 minutes)

In this presentation we investigate the solutions to the reduced plate model, with hinged-free boundary conditions and action of wind in the chord-wise direction, given as:

$$\begin{split} u_{tt}+ku_t+\Delta^2 u+[P-S\int_\Omega u_x^2]u_{xx}&=g+\alpha u_y\quad\text{in}\quad\Omega\times(0,T)\\ u&=u_{xx}=0\quad\text{on}\quad\Gamma_D\\ u_{yy}+\sigma u_{xx}&=0,\quad u_{yyy}+(2-\sigma)u_{xxy}=0\quad\text{on}\quad\Gamma_N\\ u(x,y,0)&=u_0(x,y),\quad u_t(x,y,0)=v_0(x,y)\quad\text{in}\quad\Omega. \end{split}$$

Here  $\Omega \in \mathbb{R}^2$  is closed rectangle domain, P > 0 is prestressing force and  $S \ge 0$  is a coefficient to the restoring force resulting from the nonlocal stretching effect in the *x*-direction. In this reduced model, the plate possesses external forces g acting in a normal direction to the plate, which represents the time-delay forces. We study the solutions of the linearized case by comparing the dependence upon the factor of the difference of prestressing and restoring forces  $\mu \in \mathbb{R}$ , and a factor of the strength of the wind  $\alpha \in \mathbb{R}$ . The numerical results will be given by using different discretization methods. The dependence of considered coefficients upon the eigenvalues for the linearized PDE will be studied.

The talk present the results of an ongoing work with prof. Irena Lasiecka, dr Raj Dhara and dr Katarzyna Szulc.

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