a non monotone nonlocal PDE for dune morphodynamics.

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We study a nonlocal equation introduced by A.C. Fowler describing dune morphodynamics. We prove local existence in a suitable function space and prove also existence of traveling waves.

$\longrightarrow \infty \diamond \infty \longleftarrow$

Nonlocal Problems for Parabolic Inclusions

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Let Ω be an open bounded domain in $\mathbb{R}^N$, and $T > 0$. We are concerned with the existence of solutions of the following parabolic inclusion

$u_t + Lu \in F(x,t,u)$, $(x,t) \in \Omega \times (0,T)$, $u(x,t) = 0$ *on* $\partial\Omega \times [0,T]$

subjected to the nonlocal condition $u(x,0) = \int_0^T g(x,t,u(x,t))dt$, $x \in \Omega$.

We provide sufficient conditions on L, F and g that guarantee the existence of at least one solution.

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Optimal decay rate estimates for viscoelastic dissipative

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The linear viscoelastic equation is considered:

$$\begin{cases} y_{tt} - \Delta y + h * \Delta y = 0 \quad \text{in } \Omega \times (0,\infty) \\ y = 0 \quad \text{on } \Gamma_0 \times (0,\infty) \\ \partial_\nu y - h * \partial_\nu y + g(y_t) = 0 \quad \text{on } \Gamma_1 \times (0,\infty) \end{cases}$$

where Ω is a bounded domain of $\mathbb{R}^n$, $n \geq 1$, with a smooth boundary $\Gamma = \Gamma_0 \cup \Gamma_1$. Here, Γ_0 and Γ_1 are closed, non-empty and disjoint and ν represents the unit outward normal to Γ.

We prove uniform decay rates of the energy by assuming a nonlinear feedback acting on the boundary, *without imposing any growth assumption on the damping term near the origin and strongly weakening the usual assumptions on the domains, namely, star-shaped ones, when* $-\frac{h'}{h}$ *is bounded from below by a positive constant and improving the usual assumptions on the kernels.* Our estimate depends both on the behavior of the damping term near zero *and* on the behavior of the relaxation function at infinity.

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Runge-Kutta convolution quadrature methods for well-posed equations with memory

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In this work we consider well-posed linear equations with memory $u(t) = A * u(t) + f(t)$, $t \geq 0$, and its time discretization by means of Runge-Kutta convolution quadrature methods. In this settintg $A(t)$ stands for family of linear operators with suitable assumption concerning with the dedcreasing behaviour at infinity. We notice that the sectorial case already studied (see [Lubich-Ostermann, 93]) The main result of this woks shows that the numerical solution yielded by the mentioned methods can be written as a rate of the continuous solution integrated along a positive meassure. From this results, the error analysis turns out to be straightforward by applying very well know results of [Brenner-Thomme, 79] related with rational approximations of semigroups.

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Asymptotic stability of the wave equation on compact surfaces

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Marcelo Cavalcanti, Ryuichi Fukuoka and Juan Soriano

This talk is concerned with the study of the wave

equation on compact surfaces and locally distributed damping, described by

$$u_{tt} - \Delta_{\mathcal{M}} u + a(x)\, g(u_t) = 0 \quad \text{on } \mathcal{M} \times]0, \infty[\,,$$

where $\mathcal{M} \subset \mathbb{R}^3$ is a smooth oriented embedded compact surface without boundary. Denote the Riemannian metric induced on $\mathcal{M}$ by $\mathbb{R}^3$ by $\mathbf{g}$. First of all we prove that for $\epsilon > 0$, there exist an open subset $V \subset \mathcal{M}$ and a smooth function $f : \mathcal{M} \to \mathbb{R}$ such that $meas(V) \geq meas(\mathcal{M}) - \epsilon$ and $Hessf \approx \mathbf{g}$ on V.

Finally we prove that if $a(x) \geq a_0 > 0$ on an open subset $\mathcal{M}* \subset \mathcal{M}$ that contains $\mathcal{M} \backslash V$ and if g is a monotonic increasing function such that $k|s| \leq |g(s)| \leq K|s|$ for all $|s| \geq 1$, then uniform and optimal decay rates of the energy hold.

$\longrightarrow \infty \diamond \infty \longleftarrow$

Nonlocal Reaction-Diffusion Problems from Climate

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Of concern are (degenerate) reaction-diffusion systems with memory terms on the 2-sphere. Such problems arise from diagnostic climate models with bio-feedbacks. We discuss global solvability and long-term behavior.

$\longrightarrow \infty \diamond \infty \longleftarrow$

Elliptic Equations with Nonlocal Diffusion

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We will consider an elliptic boundary value problem with nonlinear and nonlocal diffusion coefficient depending on some parameter r.

We will discuss the existence of branches of solutions parametrized by r. Pointwise estimates of radial symmetric solutions will also be given.

$\longrightarrow \infty \diamond \infty \longleftarrow$

Nonlinear heat equation with a fractional Laplacian in a ball

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Nonlinear heat equation with a fractional power of Laplacian is considered in a unit ball. Homogeneous boundary conditions and small initial data are examined. For a certain range of powers of the Laplacian global-in-time mild solutions are constructed in the form of an eigenfunction expansion series. Higher-order long-time asymptotics is computed.

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