THE FIELDS INSTITUTE
FOR RESEARCH IN MATHEMATICAL SCIENCES

ABSTRACTS 1.2

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New estimates on the solutions of first order Hamiltonian systems possessing super-quadratic potentials and some applications

We study the following first order Hamiltonian system

$$\mathcal{J}\dot{u} + \nabla H(t,u) = 0, \quad \forall\ (t,u) \in S_T \times \mathbf{R}^{2N}, \qquad (1)$$

where the potential H is super-quadratic increasing at infinite. We prove two newestimates for the C^0-norm of the solutions (periodic solutions orhomoclinic soutions) of the system (1) for H satisfying: (H4).There is a constant $c > 0$, such that

$$|\nabla W(t,u)| \leq c(\nabla W(t,u), u), \forall |u| \geq 1.$$

or

$$(H5) \quad \limsup_{|u|\to\infty} \frac{W_t(t,u)}{|u|^\mu W(t,u)} = 0, \ or \ \liminf_{|u|\to\infty} \frac{W_t(t,u)}{|u|^\mu W(t,u)} = 0, \ uniformly\ in\ t.$$

Then we use these estimates to show the existence of periodic solutions and homoclinic orbits of the system (1) for H symmetric in u-variable and H without any symmetry respectively.