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In this talk we discuss a necessary and sufficient condition for a family of sums of squares operators to be globally hypoelliptic on a torus. Let  $P$  be given by

$$P = -\partial_{t_1}^2 - (\partial_{t_2} + a(t_1, t_2)\partial_x)^2,$$

where  $(t_1, t_2, x) \in \mathbb{T}^3$  and  $a \in C^\infty(\mathbb{T}^2)$  is real valued. This condition says that either a Diophantine condition is satisfied or there exists a point of finite type. Also, we describe the analytic and Gevrey versions of this result. The proof is based on  $L^2$ -estimates and microlocal analysis. (Received January 28, 2008)