■ **Tatsuo Nishitani** Osaka University, Japan, email: nishitani@math.sci.osaka-u.ac.jp,

A remark on the local and microlocal Cauchy problem for noneffectively hyperbolic operators

Abstract

We study differential operators of order 2 and give a sufficient condition in order that the micro supports of solutions to the Cauchy problem propagate with finite speed. We then study the Cauchy problem for noneffectively hyperbolic operators with no null bicharacteristic tangent to the doubly characteristic set and with zero positive trace. Checking the sufficient condition for the propagation with finite speed, we prove that the Cauchy problem for such noneffectively hyperbolic operators is C^∞ well posed if and only if the Levi condition is verified.

Bibliography

[1] Bernardi, E., Bove, A. and Parenti, C., *Geometric results for a class of hyperbolic operators with double characteristics, II* , J. Func. Anal., **116**, 62-82 (1993).

[2] Bernardi, E. and Nishitani, T., *On the Cauchy problem for non-effectively hyperbolic operators, the Gevrey 5 well-posedness*, J. Aanalyse Math., **105**, 197-240 (2008).

[3] Hörmander, L., *The Cauchy problem for differential equations with double characteristics*, J. Analyse Math., **32**, 118-196 (1977).

[4] Ivrii, V. Ja. and Petkov, V. M., *Necessary conditions for the Cauchy problem for non strictly hypebolic equations to be well posed*, Uspehi Mat. Nauk., **29**, 3-70 (1974).

[5] Ivrii, V. Ja., *The well posedness of the Cauchy problem for non-strictly hyperbolic operators, III: The energy integral*, Trans. Moscow Math. Soc., **34**, 149–168 (1978).

[6] Ivrii, V. Ja., *Wave fronts of solutions of certain pseudodifferential equations*, Trans. Moscow Math. Soc., **39**, 49–86 (1981).

[7] Nishitani, T., *On the finite propagation speed of wave front sets for effectively hyperbolic operators*, Sci. Rep. College Gen. Ed. Osaka Univ., **32**, no. 1, 1–7 (1983).

[8] Nishitani, T., *The Cauchy problem for effectively hyperbolic operators*, Nonlinear variational problems (Isola d'Elba, 1983), 9-23, Res. Notes in Math., **127**, Pitman, Boston, MA, (1985).

[9] Nishitani, T., *Cauchy Problem for Noneffectively Hyperbolic Operators*, to appear in Mem. Math. Soc. Japan