Dynamics and spectral geometry of foliations

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Lectures given during the *Trimester at Henri Poincaré Institute: Groupoids and Stacks in Physics and Geometry*, January – April 6, 2007. Below is a selected list of texts on foliation theory. The web site for the lectures is here: http://www.math.uic.edu/∼hurder/ihp2007/

References

[1] C. Camacho and A. Lins Neto, **Geometric Theory of Foliations**, Translated from the Portuguese by Sue E. Goodman, Progress in Mathematics, Birkhäuser Boston, MA, 1985.

[2] A. Candel and L. Conlon, **Foliations I, II**, Amer. Math. Soc., Providence, RI, 2000, 2003.

[3] C. Godbillon, **Feuilletages: Etudes géométriques I, II**, Publ. IRMA Strasbourg (1985-86); Progress in Math., Vol. 98, Birkhäuser, Boston, Mass., 1991.

[4] G. Hector and U. Hirsch, **Introduction to the Theory of Foliations, Part A, B**, Vieweg und Sohn, Braunschweig/Wiesbaden, second edition, 1986,1987.

[5] S. Hurder, *Coarse geometry of foliations*, **Geometric Study of Foliations, Tokyo 1993**, (eds. Mizutani et al). World Scientific, 1995: 35-96.

[6] S. Kobayashi and K. Nomizu, **Foundations of differential geometry. Vol I**, Interscience Publishers, 1963.

[7] K. Mackenzie, **General theory of Lie groupoids and Lie algebroids**, London Mathematical Society Lecture Note Series Vol. 213, Cambridge University Press, 2005.

[8] I. Moerdijk and J. Mrčun, **Introduction to foliations and Lie groupoids**, Cambridge Studies in Advanced Mathematics Vol. 91, Cambridge University Press, 2003.

[9] C. Molino, **Riemannian foliations**, Progress in Mathematics Vol. 73, Birkhäuser 1988.

[10] C.C. Moore and C. Schochet, **Analysis on Foliated Spaces** *Mathematical Sciences Research Institute Publications Vol. 9*, sec. ed., Cambridge University Press, 2006.

[11] I. Tamura, **Topology of foliations: an introduction**, Translated from the 1976 Japanese edition and with an afterword by Kiki Hudson, With a foreword by Takashi Tsuboi, American Mathematical Society, Providence, R.I., 1992.

[12] Ph. Tondeur, **Geometry of foliations**, Monographs in Mathematics vol. 90, Birkhäuser Verlag, Basel, 1997.

[13] P. Walczak, **Dynamics of foliations, groups and pseudogroups**, Instytut Matematyczny Polskiej Akademii Nauk. Monografie Matematyczne (New Series) [Mathematics Institute of the Polish Academy of Sciences. Mathematical Monographs (New Series)], Vol. 64 Birkhäuser Verlag, Basel, 2004.

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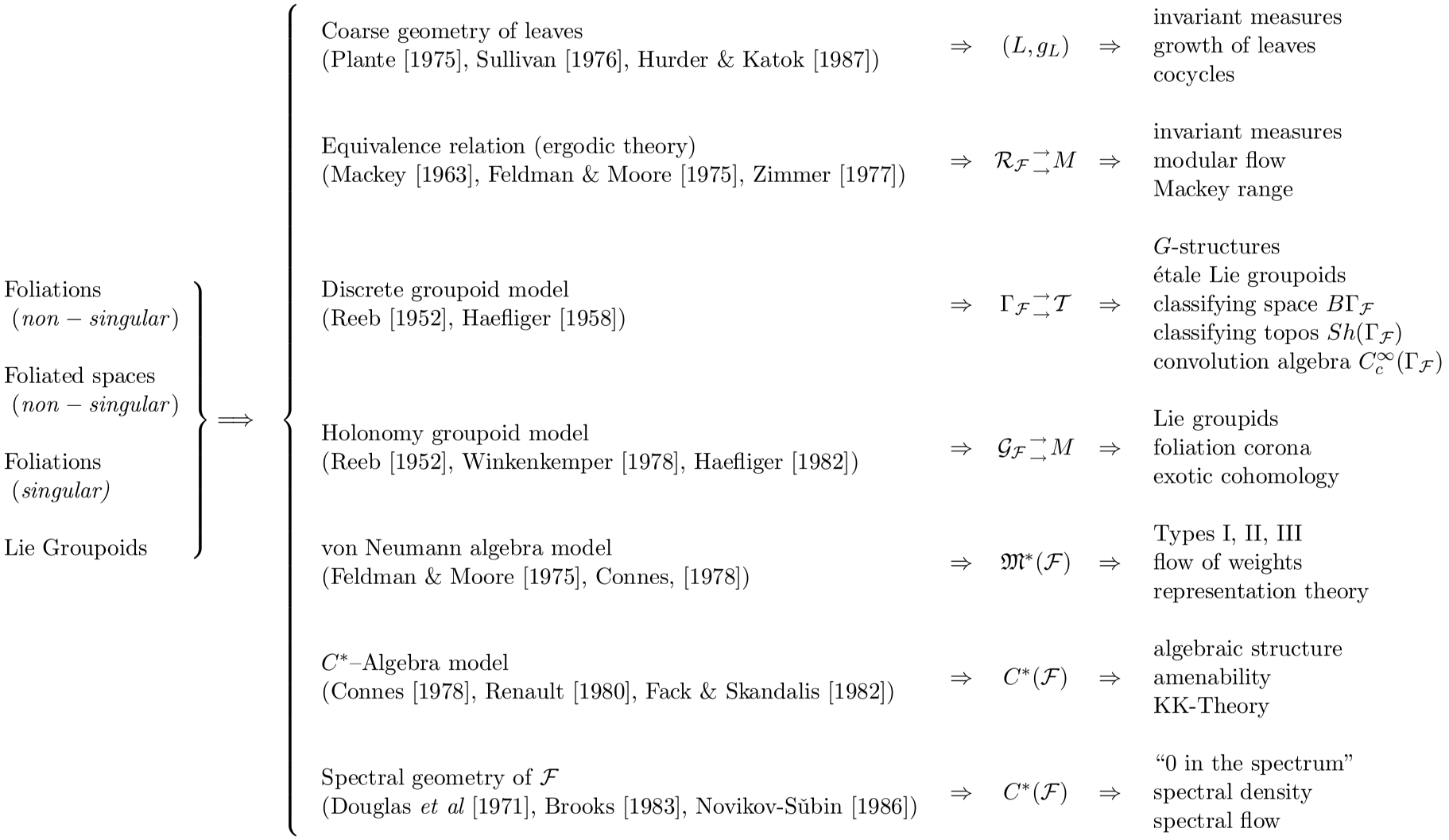
Foliations
(non − singular)
Foliated spaces
(non − singular)
Foliations
(singular)
Lie Groupoids
⟹
Coarse geometry of leaves
(Plante [1975], Sullivan [1976], Hurder & Katok [1987])
⇒ (L, g_L) ⇒
invariant measures
growth of leaves
cocycles
Equivalence relation (ergodic theory)
(Mackey [1963], Feldman & Moore [1975], Zimmer [1977])
⇒ R_F ⇉ M ⇒
invariant measures
modular flow
Mackey range
Discrete groupoid model
(Reeb [1952], Haefliger [1958])
⇒ Γ_F ⇉ T ⇒
G-structures
étale Lie groupoids
classifying space BΓ_F
classifying topos Sh(Γ_F)
convolution algebra C_c^∞(Γ_F)
Holonomy groupoid model
(Reeb [1952], Winkenkemper [1978], Haefliger [1982])
⇒ G_F ⇉ M ⇒
Lie groupids
foliation corona
exotic cohomology
von Neumann algebra model
(Feldman & Moore [1975], Connes, [1978])
⇒ 𝔐*(F) ⇒
Types I, II, III
flow of weights
representation theory
C*–Algebra model
(Connes [1978], Renault [1980], Fack & Skandalis [1982])
⇒ C*(F) ⇒
algebraic structure
amenability
KK-Theory
Spectral geometry of F
(Douglas et al [1971], Brooks [1983], Novikov-Sŭbin [1986])
⇒ C*(F) ⇒
“0 in the spectrum”
spectral density
spectral flow