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BOOK REVIEWS

Davies, K. M. and Chang, Y.-C. *Lectures on Bochner–Riesz means* (London Mathematical Society Lecture Note Series 114, Cambridge University Press, Cambridge, 1987), pp. x + 150, 0 521 31277 9, paper, £15.

The Bochner–Riesz means, defined in the series case by $S_R^\alpha f(\theta)=\sum(1-|k|^2/R^2)_+^\alpha \hat{f}(k)e^{2\pi ik\theta}$ and originating of course in classical summability theory, are of considerable interest in harmonic analysis at the present time. For example, the problem of whether or not $(1-|x|^2)_+^\alpha$ is an $L^p(R^n)$ multiplier for $2n/(n+1+2\alpha)<p<2n/(n-1-2\alpha)$, which would be the optimal range, is still open and attracting considerable attention although the case $n=2$ was settled affitmatively by L. Carleson and P. Sjölin in 1972. The book under review aims to make available to postgratuate students some of the results in the area which have appeared in journals since about that time, and in this succeeds well.

After an opening chapter on the elementary properties of multipliers of Fourier series and integrals, which includes proofs of the Riesz–Thorin and Marcinkiewicz interpolation theorems, the authors give a modern and relevant treatment of the Hilbert transform, including maximal functions and Calderon–Zygmund decomposition. This is followed by a short chapter on good lambda and weighted norm inequalities, including the A_p condition. The treatment of multipliers with singularities begins with proofs of the Hörmander–Mihlin and Marcinkiewicw multiplier theorems and the Littlewood–Paley decomposition theorem, and then has a discussion of singularities on curves, in particular on $|x|=1$. The final chapters are on restriction theorems, C. Fefferman's celebrated resolution of the multiplier problem for the characteristic function of the unit ball, and Cordoba's 1979 proof of (essentially) Carleson and Sjölin's result.

The typescript is pleasing and it is reproduced well, though there are many slips and misprints. These are mainly of a trivial nature, but it is annonying to find the optimal range for L^p boundedness given differently in the introduction to Chapter 6 and in the statement of the actual result, Theorem 6.9. Again, in the case $n=2$, Corollary 8.10 simply says "Bochner–Riesz means are bounded on the optimal range", without making it clear that this refers not to $4/(3+2\alpha)<p<4/(1-2\alpha)$ but to the universal range $4/3\leq p\leq 4$ valid for all α. It is also disconcerting to meet numbers such as 52^j and 2002^j (the reader has to realise that these denote multipliers of 2^j by 5 and 200) and to have n used in Theorem 1.25 for the dimension and also as the index of the Fourier coefficient. The authors' style is informal in the extreme. This is no bad thing, but occasionally, where they lead the reader up a blind alley for didactic reasons, it meant that the reviewer was puzzled about the exaxt status of an argument; there is also a sentence on page 43, 'ine 9, which is offensive and should not have been allowed by the editors to appear. However, a good graduate student, or indeed a more advanced researcher, will learn a great deal in finding his way through the book, and its apprarance is to be welcomed, particularly at such a reasonable price.

PHILIP HEYWOOD

Oliver, R. *Whitehead groups of finite groups* (London Mathematical Society Lecture Note Series 132, Cambridge University Press, Cambridge 1988) x + 349 pp, paper: 0 521 33646 5, £19.50.

The first generation of invariants of algebraic topology were homotopy invariants involving free modules, such as the homology groups of chain complexes of such modules. The study of homotopy-equivalent manifolds which were not homeomorphic (such as lens spaces) led to a second generation of invariants, involving based free modules, such as the torsion invariant $\tau(f)\in \mathrm{Wh}(\pi)$ introduced by J. H. C. Whitehead some 50 years ago for a homotopy equivalence $f:X\rightarrow Y$ of finite simplicial (or CW) complexes, with $\pi=\pi_1(X)$ the fundamental group. The