SOLVABILITY OF DIFFERENTIAL OPERATORS I:

DIRECT AND SEMIDIRECT PRODUCTS OF LIE GROUPS

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1.   INTRODUCTION

Let G be a Lie group. The group G acts on itself by left (or

right) translations. A linear differential operator P on G is said

to be left (or right) invariant if it commutes with the left (or right)

action of G, i.e. if it satisfies

$$P(f \circ L_g) = (Pf) \circ L_g \quad (\text{or } P(f \circ R_g) = (Pf) \circ R_g)$$

for all $g \in G$, $f \in C^\infty(G)$, where for $x \in G$

$$L_g(x) = gx \quad \text{and} \quad R_g(x) = xg.$$

The operator P is said to be bi-invariant if it is left and right

invariant.

All the Lie groups considered in this paper are real.

We identify the algebra of left invariant linear differential

operators on G with the complexified universal enveloping algebra