the forces on the stalled surfaces the area is much more important than other geometrical properties, so a long keel yacht will have more damping than a fin-keel one. This is an important conclusion, which speaks in favour of traditional designs and against more modern ones with a small lateral area.

It should be pointed out also, that forward speed increases damping considerably, particularly for fin-keel yachts. If the speed is high enough the keel starts working properly and the forces get much larger. Fig 4.17 shows how the roll amplitude decays with time for *Grimalkin* in still water. At zero speed the decay is much smaller than at high speed, where the rolling is rapidly damped. It is therefore important, especially for fin-keel yachts, to keep the speed up under critical conditions.

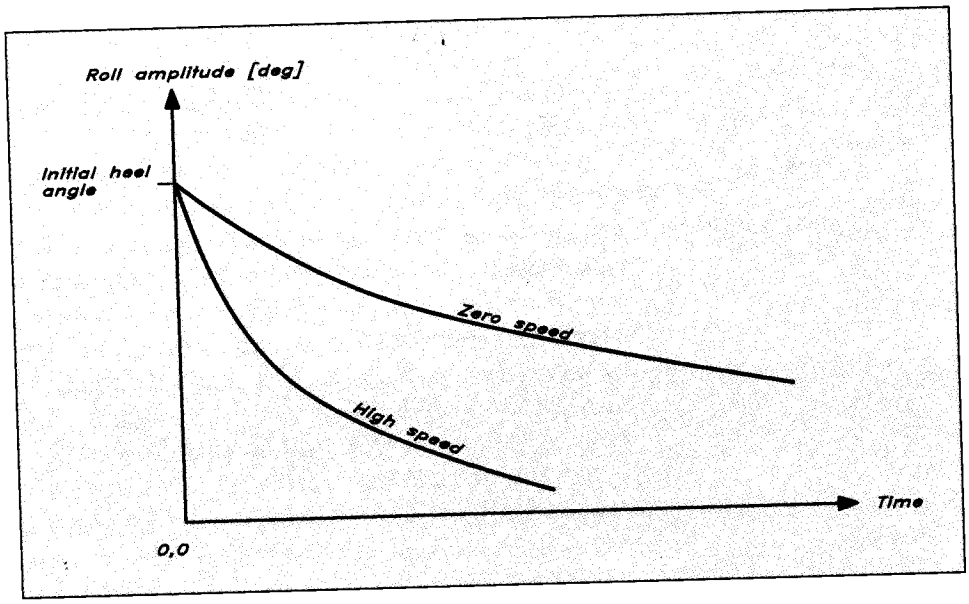

Fig 4.17 *Influence of speed on roll damping – fin-keel yacht*

Influence of waves on the righting moment

The righting moment is influenced by waves in two ways:

- The wave profile along the hull changes the waterline shape
- The centrifugal forces on the water particles change the pressure in the wave

As regards the wave profile, two typical cases may be distinguished. These are shown in Fig 4.18. Hogging is when the wave crest is at midship, and sagging when the trough is at this position. For a sailing yacht, with some flare at all sections, hogging means that the submerged part of the hull gets thinner at the ends and beamier at midship. Since the water plane moment of inertia and the metacentric radius depend on beam cubed (Figs 4.8 and 4.9), this results in an increase in stability. In sagging the opposite occurs, with an increase in beam at the ends and a reduction at midship, ie a more even distribution of beam, which causes a reduction in stability. (It may be