

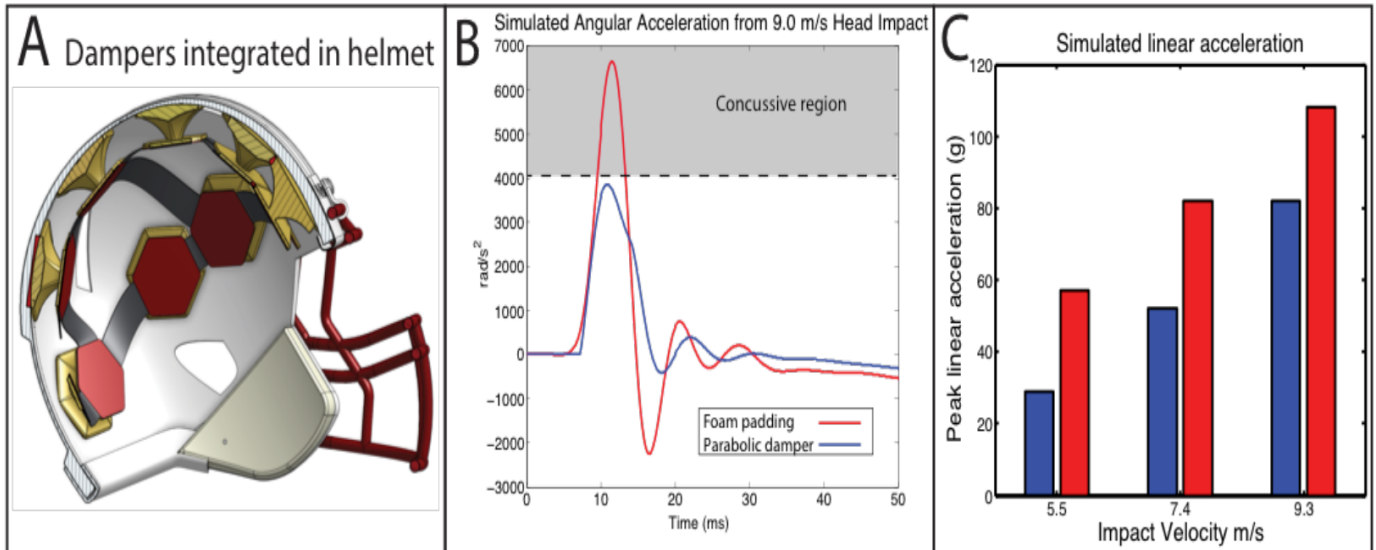
Docket #: S16-466

Ideal Damper for Concussion Protection

Stanford researchers have developed protective padding that reduces linear and rotational acceleration of the head during a collision, to minimize concussions. The design uses a fluid-filled pad that exerts constant force regardless of impact velocity, and absorbs impact energy to perfectly match the velocity of impact. This ideal force-displacement property allows the pad to absorb close to the theoretical maximum energy. Beyond helmet applications, the pad could also be used in any situation where energy needs to be dissipated efficiently, such as car seats, automotive bumpers, aircraft landing gears, and personal protective equipment.

Stage of Research

Researchers have developed prototypes, and proved experimentally and in simulation that the ideal damper fluid filled padding is better than conventional foam padding in controlled impact testing of individual pads (see figure below). Current focus is integrating technology into existing football and bike helmets, and testing performance.



Ideal damper pad vs. conventional foam padding

A. Parabolic pads are distributed inside a conventional football helmet shell to provide full protection coverage. B. Simulated angular acceleration of ideal damper (blue) versus conventional foam padding (red) at a 9.0 m/s head impact. C. Peak linear accelerations at three different impact speeds for ideal damper (blue) versus conventional foam padding (red).

Related Technologies:

19-367 - a rechargeable, fluid-based shock absorber material for use in personal protective equipment such as helmets. Allows for custom fit to the user without the need for inflatable pads or 3d scanning of the user's head.

Applications

- Impact protection – ideal for helmets, athletic equipment, car seats, automotive bumpers, aircraft landing gears, etc.

Advantages

- Minimizes the impact forces that cause concussions compared to conventional foam padding.

Patents

- Issued: [11,632,999 \(USA\)](#)

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